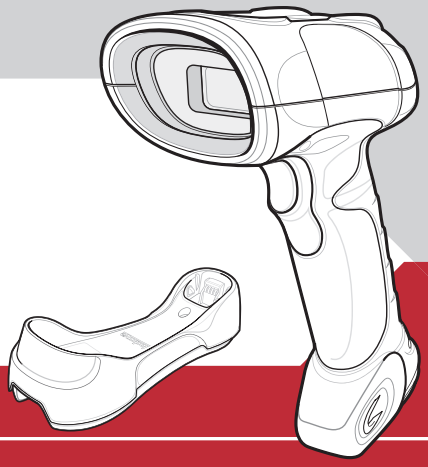
DS 3478

Product Reference Guide



symbol®
The Enterprise Mobility Company™

DS 3478 Smart Focus Digital Scanner
Product Reference Guide

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June 2005

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Introduction

The *DS 3478 Smart Focus Digital Scanner Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the digital scanner.

Chapter Descriptions

- *Chapter 1, Getting Started* provides a product overview and unpacking instructions.
- *Chapter 2, Digital Scanning* describes parts of the digital scanner, beeper and LED definitions, and how to use the digital scanner.
- *Chapter 3, Maintenance and Technical Specifications* provides information on how to care for the digital scanner, troubleshooting, and technical specifications.
- *Chapter 4, User Preferences* provides the programming bar codes necessary for selecting user preference features for the digital scanner.
- *Chapter 5, Decoding Preferences* describes digital scanner preference features and provides the programming bar codes for selecting these features.
- *Chapter 6, Keyboard Wedge Interface* provides information for setting up the digital scanner for keyboard wedge operation.
- *Chapter 7, RS-232 Interface* provides information for setting up the digital scanner for RS-232 operation.
- *Chapter 8, USB Interface* provides information for setting up the digital scanner for USB operation.
- *Chapter 9, IBM 468X/469X Interface* provides information for setting up the digital scanner with IBM 468X/469X POS systems.
- *Chapter 10, Wand Emulation Interface* provides information for setting up the digital scanner for wand emulation operation.
- *Chapter 11, Scanner Emulation Interface* provides information for setting up the digital scanner for scanner emulation operation.
- *Chapter 12, 123Scan* provides information on the PC-based scanner configuration tool 123Scan.
- *Chapter 13, Symbologies* describes all symbology features and provides the programming bar codes for selecting these features.
- *Chapter 14, Miscellaneous Scanner Options* includes commonly used bar codes to customize how data is transmitted to the host device.
- *Chapter 15, Advanced Data Formatting* (ADF) describes how to customize scanned data before transmitting to the host.
- *Appendix A, Standard Default Parameters* provides a table of all host and miscellaneous scanner defaults.
- *Appendix B, Programming Reference* provides tables of Symbol and AIM code identifiers and modifier characters.
- *Appendix C, Sample Bar Codes* includes sample bar codes for supported code types.
- *Appendix D, Numeric Bar Codes* includes the numeric bar codes to scan for parameters requiring specific numeric values.

Notational Conventions

The following conventions are used in this document:

- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.
- Throughout the programming bar code menus, asterisks (*) are used to denote default parameter settings.

Related Publications

The *DS 3478 Quick Start Guide* (p/n 72-72130-xx) provides general information for getting started with the digital scanner, including basic setup and operation instructions.

For the latest versions of the *DS 3478 Quick Start Guide* and *the DS 3478 Product Reference Guide* go to: http://www.symbol.com/manuals.

Service Information

If you have a problem with your equipment, contact the *Symbol Support Center*. Before calling, have the model number, serial number, and several of your bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is symbol readability, the Support Center will request samples of your bar codes for analysis at our plant.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.

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For service information, warranty information or technical assistance contact or call the Symbol Support Center listed below. **For the latest service information go to http://www.symbol.com**.

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If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.

1 Getting Started

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Introduction

The DS 3478 digital scanner combines excellent digital scanning performance and advanced ergonomics to provide the best value in a lightweight digital scanner, ensuring comfort and ease of use for extended periods of time.

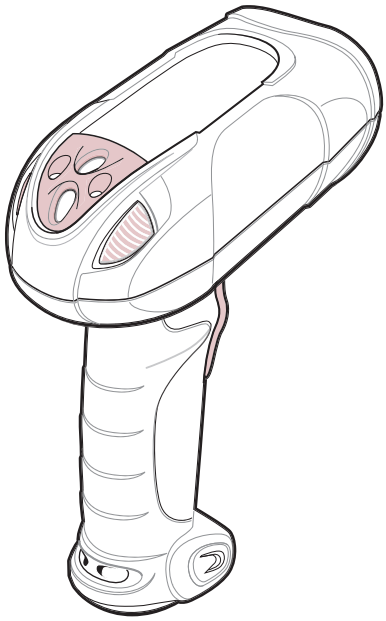

Figure 1-1. DS 3478 Smart Focus Digital Scanner

Smart Focus Scanning

The digital scanner supports a Smart Focus mode which toggles the focus position after every frame between near and far focus, optimizing decoding performance when scanning a combination of small and large bar codes. See *Focus Mode on page 5-5* to select this mode.

Host Interfaces

This digital scanner supports the following host interfaces through communication with a cradle:

- Standard RS-232 connection to a host.
- Keyboard wedge connection to a host, where scanned data is interpreted as keystrokes. The following international keyboards are supported (for Windows™ environment): North American, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Japanese, and Brazilian-Portuguese.
- Wand emulation connection to a mobile computer, a controller, or host, which collects the data as wand data and decodes it.
- Scanner emulation connection to a mobile computer or a controller, which collects the data and interprets it for the host.
- IBM® 468X/469X hosts.
- USB connection to a host. The digital scanner autodetects a USB host and defaults to the HID keyboard interface type. Select other USB interface types by scanning programming bar codes. The following international keyboards are supported (for Windows™ environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Japanese, and Brazilian-Portuguese.
- Synapse capability, which allows connection to a wide variety of host systems using a Synapse cable and Synapse adapter cable. The digital scanner autodetects the Synapse interface.
- Configuration via 123Scan.

Unpacking the Digital Scanner

Remove the digital scanner from its packing and inspect it. If the digital scanner was damaged in transit, call the *Symbol Support Center* at one of the telephone numbers listed on page xvii. **KEEP THE PACKING**. It is the approved shipping container and should be used if the equipment needs to be returned for servicing.

The Digital Scanner Cradle

The digital scanner cradle serves as a stand, charger, and host interface for the digital scanner. There are two versions of the cradle:

- **Charging cradle with radio**: All communication between the cordless digital scanner and the host computer is accomplished through the cradle. Each bar code contains programming instructions or other data unique to the bar code pattern. The digital scanner transmits bar code data to the cradle via a wireless radio antenna. The cradle then sends that information via an interface cable to the host computer for interpretation.
- **Charge-only cradle**: This cradle serves as a stand and battery charger. Since one radio-enabled cradle can receive information from up to four digital scanners, it is possible to have several charge-only cradles.

The charging cradle with radio supports two modes of operation:

- **Single point mode**: the cradle communicates with one digital scanner.
- **Multipoint mode**: the cradle communicates with more than one digital scanner.

The cradle sits on a desktop or mounts on a non-horizontal surface (such as a wall or forklift), depending on the environment. For more information about mounting options and procedures, refer to the documentation included with the cradle.

Cradle Parts

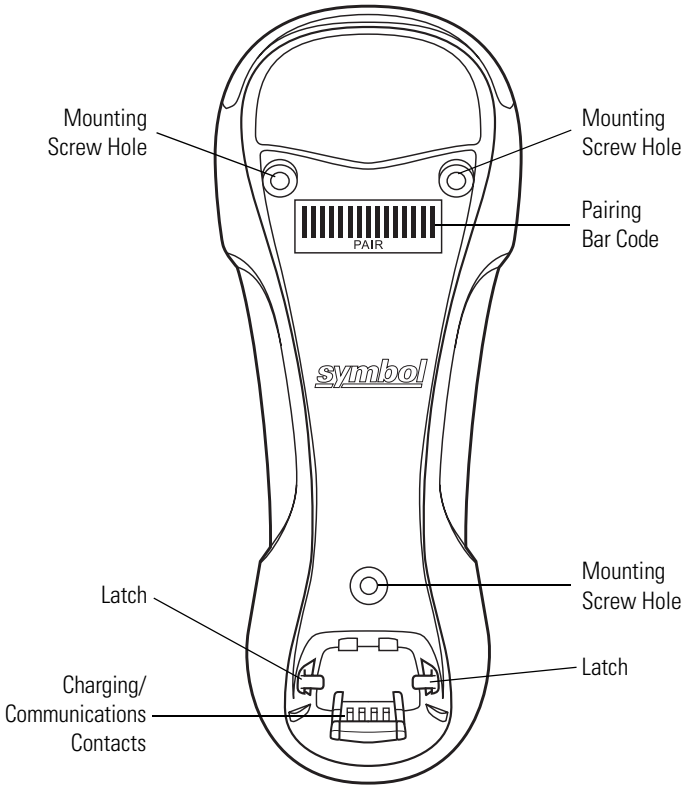

Figure 1-2. Cradle Front View

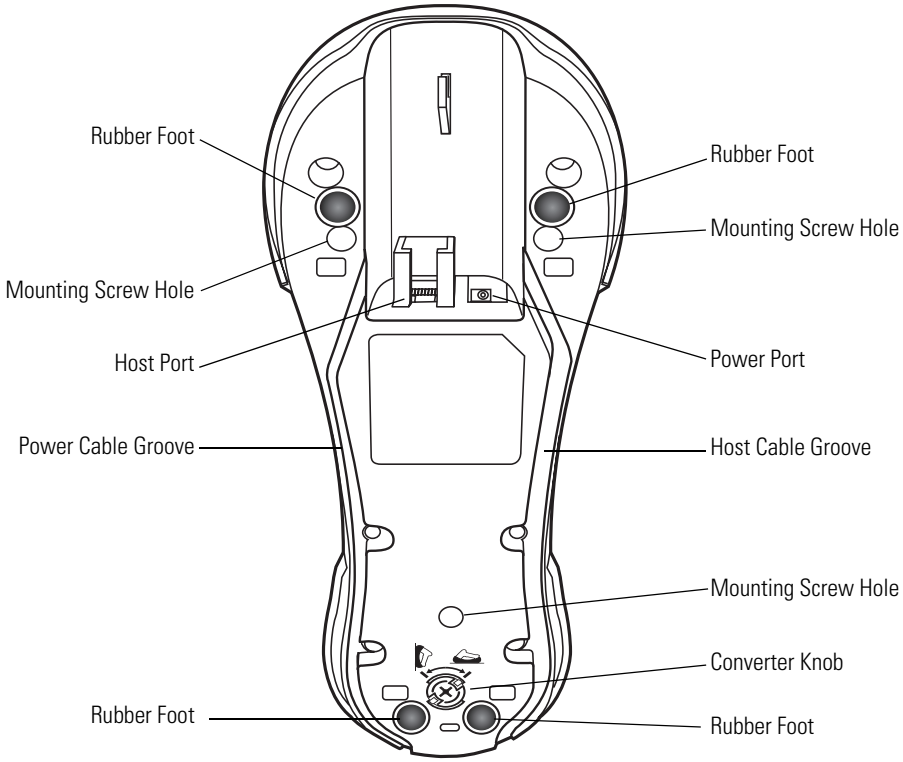

Figure 1-3. Cradle Back View

Connecting the Cradle

Important: Connect the interface cable and power supply in the following order to ensure proper operation of the digital scanner and cradle. Note that this procedure includes two different power supply options.

1. Disconnect the power supply from the digital scanner cradle. See Figure 1-4.
2. Insert the modular connector of the interface cable into the host interface port on the back of the digital scanner cradle.
3. If using a power supply that connects to the interface cable, insert this power supply into the power connector on the interface cable, and the other end into an AC supply (see the cradle's *Quick Reference Guide* for more information).
4. Insert the other end of the interface cable into the appropriate port on the host computer (see the specific host chapter for information on host connections).

5. If using an external power supply, insert the power cable into the power port on the back of the digital scanner cradle, and connect the power supply to an approved AC supply (see the cradle's *Quick Reference Guide* for more information).

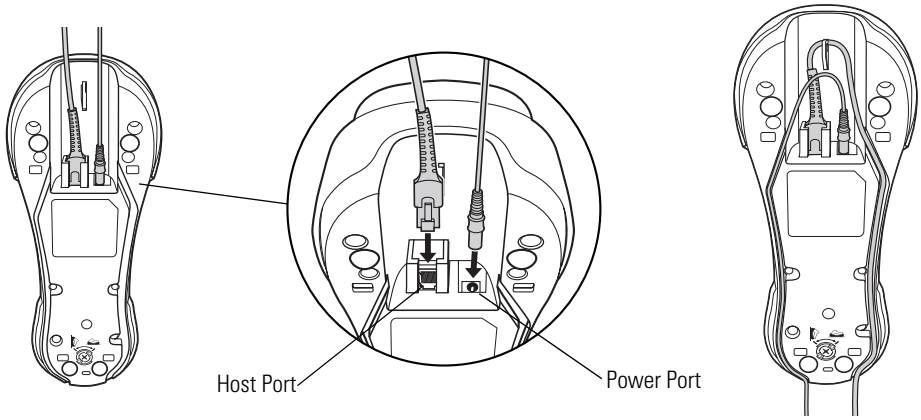

Figure 1-4. Connecting the Cables to the Cradle

Note

Disconnect the power supply before changing host cables, or the digital scanner may not recognize the new host.

Different cables are required for different hosts. The connectors illustrated in each host chapter are examples only. The connectors may be different from those illustrated, but the steps to connect the digital scanner remain the same.

Supplying Power to the Cradle

The cradle receives power from one of two sources:

- An external power supply.
- When connected to a powered host through a host cable that supplies power.

The cradle detects whether the host or an external supply is supplying power. It always draws power from the external supply when available, regardless of the presence of power from a host.

Using the Host to Supply Power

When the cradle is connected to a powered host, the host can sometimes power the cradle rather than an external power supply. Consider the following when powering from a host:

- The digital scanner charges at a slower rate than when charging from an external power supply.
- The cradle can charge a digital scanner only in single point mode. An external power supply is required to charge a digital scanner in multipoint mode.
- A powered USB port provides enough power to the cradle for charging.
- Not all hosts provide enough power to the cradle for charging. For these hosts, connect an external power supply.

Note

The radio link functions normally when the cradle draws power from a host.

For more information on single and multipoint operation, see *Pairing on page 1-11*.

Connecting a Synapse Cable Interface

Note

Refer to the *Synapse Interface Guide* provided with the Synapse cable for more information.

Symbol's Synapse Smart Cables enable interfacing to a variety of hosts. The appropriate Synapse cable detects the host.

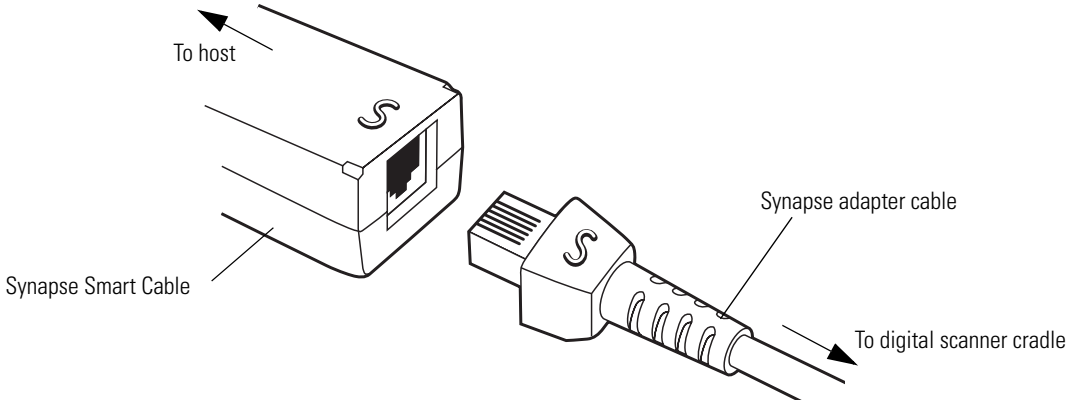

Figure 1-5. Synapse Cable Connection

1. Plug the Synapse adapter cable into the bottom of the digital scanner cradle, as described in *Connecting the Cables to the Cradle on page 1-7*.
2. Align the 'S' on the Synapse adapter cable with the 'S' on the Synapse Smart Cable and plug the cable in.
3. Connect the other end of the Synapse Smart Cable to the host.

Reestablishing a Lost Connection to Host

If scanned data does not transmit to the cradle's host, ensure all cables are firmly inserted and the power supply is connected properly. If scanned data still does not transmit to the host, reestablish connection with the host:

1. Disconnect the power supply from the cradle.
2. Disconnect the host interface cable from the cradle.
3. Wait three seconds.
4. Reconnect the host interface cable to the cradle.
5. Reconnect the power supply to the cradle.
6. Re-establish pairing with the cradle.

Mounting the Cradle

For information on mounting the cradle, refer to the documentation included with the cradle.

Removing and Inserting the Battery

The battery resides in a chamber in the digital scanner handle. To insert the battery:

1. Insert a coin or flathead screwdriver in the slot at the base of the digital scanner, then turn the slot counterclockwise to release the latch.
2. Open the latch.
3. If a battery is already installed, turn the digital scanner upright to slide the battery out.
4. Slide the new battery into the chamber, with the rounded side toward the back and the contacts facing into the chamber.

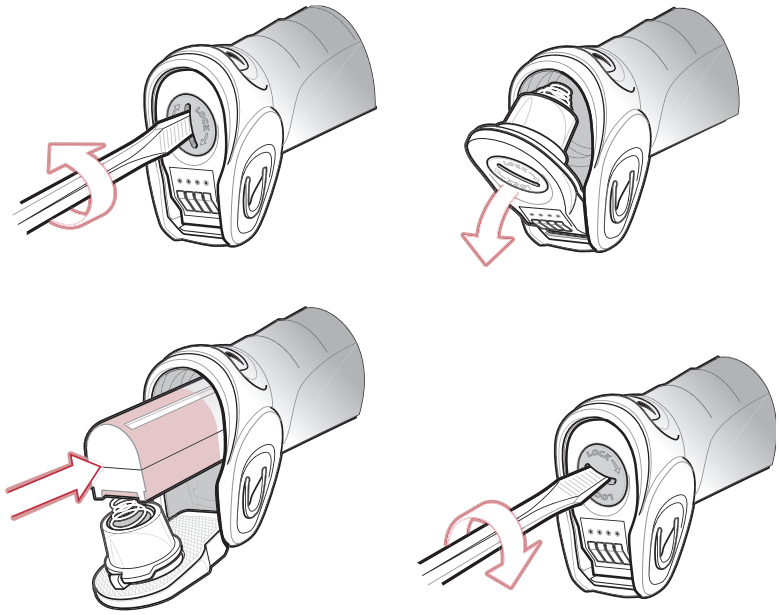

Figure 1-6. Inserting the Battery

5. Close the latch.
6. Insert a coin or flathead screwdriver in the slot at the base of the digital scanner, press down gently, and turn the slot clockwise to lock the latch in place.

Charging the Battery

For best performance, fully charge the digital scanner battery before using the digital scanner for the first time. To charge the battery, place the digital scanner in the cradle, ensuring that the metal contacts on the bottom of the digital scanner touch the contacts on the cradle. The battery begins charging. A complete charge can take up to four hours, depending on the remaining charge in the battery.

Charge within the recommended temperature of 32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal.

Charging LED

The flashing green LED indicates charging activity. See *Table 2-2 on page 2-6*. If the digital scanner is charging in fast mode (external power supply is present), the green LED blinks quickly (on for 0.25 seconds, off for 0.75 seconds). If the digital scanner is charging in slow mode (host-powered mode), the LED blinks slowly (on for 0.5 seconds, off for 1.5 seconds).

Charging Problem LED

A solid or flashing red LED during charging indicates a charging problem. See *Table 2-2 on page 2-6* for definitions of error conditions and the appropriate action to take.

Inserting the Digital Scanner in the Cradle

Insert the digital scanner in the cradle so that the metal contacts on the bottom of the digital scanner handle touch the contacts on the cradle:

1. With a slightly rotated motion, insert the digital scanner into the cradle top first.
2. Push the handle down until it clicks into place, engaging the contacts in the cradle and digital scanner.

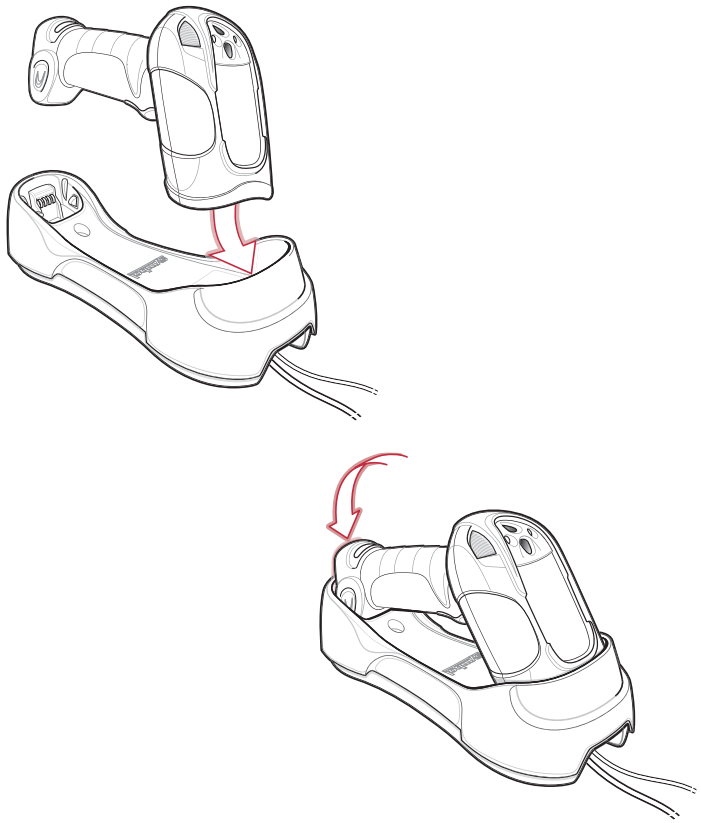

Figure 1-7. Inserting the Digital Scanner in the Cradle

Pairing

Pairing is the process by which a digital scanner initiates communication with a cradle. The cradle has multipoint capability, and can pair with up to four digital scanners at a time. The cradle includes a pairing bar code.

To pair the digital scanner with the cradle, scan the pairing bar code on the cradle. A short low-high beep indicates successful pairing.

The pairing bar code that connects the digital scanner to a cradle is unique to each cradle.

Do not scan data or parameters until pairing completes.

Unpairing

Unpair the digital scanner from the cradle to make the cradle available for pairing with another digital scanner. Scan the **Unpairing** bar code on *page 4-12* to unpair the digital scanner from its cradle.

An unpairing bar code is also included in the *DS 3478 Quick Start Guide*.

Configuring the Digital Scanner

Use the bar codes in this manual or the 123Scan configuration program to configure the digital scanner. See *Chapter 4, User Preferences* and each host chapter for information about programming the digital scanner using bar code menus. See *Chapter 12, 123Scan* to configure the digital scanner using this configuration program. 123Scan includes a help file.

2 Digital Scanning

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Introduction

This chapter provides beeper and LED definitions, digital scanning techniques, general scanning instructions and tips, and decode zone diagrams.

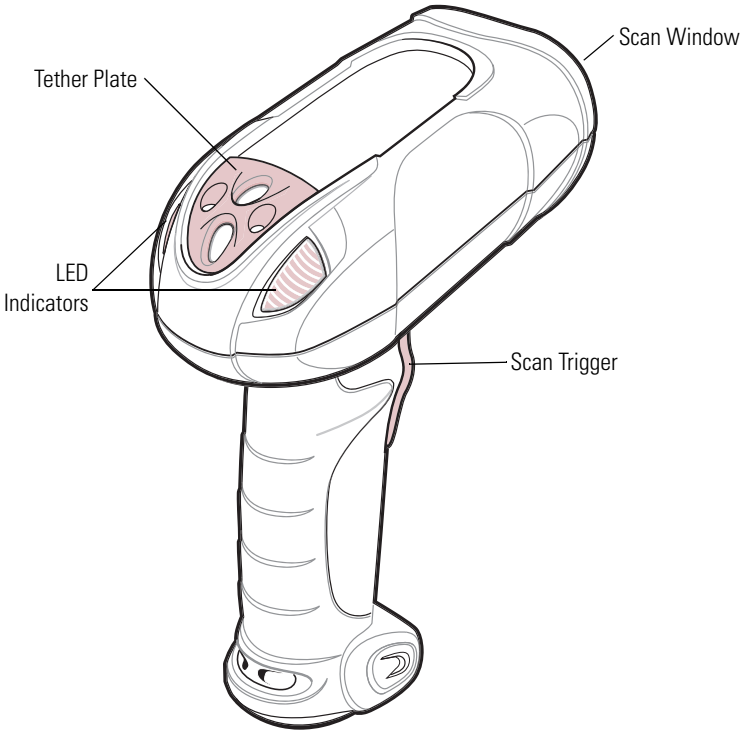


Figure 2-1. Parts of the Digital Scanner

Beeper Definitions

The digital scanner emits different beeper sequences and patterns to indicate its status. Table 2-1 defines beep sequences that occur during both normal scanning and while programming the digital scanner.

Table 2-1. Standard Beeper Definitions

Beeper Sequence	Indication
Standard Use	
Short low-short medium-short high beeps	Power up.
One short high beep	The digital scanner successfully decoded a bar code (if the decode beeper is enabled).
Four long low beeps	A communication error occurred while transmitting a scanned symbol to a host. The data is ignored. This occurs if the digital scanner is not properly configured or if the digital scanner has disconnected from the cradle.
Long low-high beeps	Attempt to pair with the cradle was unsuccessful. Ensure that the cradle has power; if not, cycle power to the cradle and re-attempt the pairing.
Four short high beeps	Low battery indication.
Long low-high-low-high beeps	Attempt to pair with a cradle that is already paired with the maximum number of digital scanners.
Five long low beeps	Conversion or format error.
Low-high-low beeps	ADF transmit error.
Short high-short high-short low-short low beeps	Radio failure.
Cordless Digital Scanner Connection	
Short low-short high beeps	The digital scanner connected to the cradle after scanning a pairing bar code or automatically after a disconnect.
Short high-short low beeps	The digital scanner disconnected from the cradle either because the digital scanner moved out of range of the cradle, the USB host suspended the cradle, or cradle power was interrupted.
Parameter Menu Scanning	
Short high beep	Correct entry scanned or correct menu sequence performed.
Long low-long high beeps	Input error; incorrect bar code, programming sequence or **Cancel** scanned. The digital scanner remains in ADF program mode.
Short high-short low beeps	Keyboard parameter selected. Enter value using numeric bar codes.
Short high-short low-short high-short low beeps	Successful program exit with change in the parameter setting.
Code 39 Buffering	
High-low beeps	New Code 39 data was entered into the buffer.
Three long high beeps	Code 39 buffer is full.
Low-high-low beeps	The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer.
Low-high beeps	A successful transmission of buffered data.
Macro PDF	
Two long low beeps	File ID error. A bar code not in the current Macro PDF sequence was scanned.
Three long low beeps	Out of memory. There is not enough buffer space to store the current Macro PDF symbol.
Four long low beeps	Bad symbology. Scanned a 1D or 2D bar code in a Macro PDF sequence, a duplicate Macro PDF label, a label in an incorrect order, or trying to transmit an empty or illegal Macro PDF field.
Five long low beeps	Flushing Macro PDF buffer.

Table 2-1. Standard Beeper Definitions (Continued)

Beeper Sequence	Indication
Fast warble beep	Aborting Macro PDF sequence.
Low-high beeps	Flushing an already empty Macro PDF buffer.
ADF Programming Normal Data Entry	
High-low beeps	Enter another digit. Add leading zeros to the front if necessary.
Low-low beeps	Enter another alphabetic character or scan the **End of Message** bar code.
High-high beeps	Enter another criterion or action, or scan the **Save Rule** bar code.
High-low-high-low beeps	Rule saved. Rule entry mode exited.
High-low-low beeps	All criteria or actions cleared for current rule, continue entering rule.
Low beep	Delete last saved rule. The current rule is left intact.
Low-high-high beeps	All rules have been deleted.
Short low-short high-short low-short high beeps	Out of host ADF parameter storage space. Scan *Set Default Parameter on page 4-5*.
ADF Programming Error Indications	
Low-high-low-high beeps	Out of rule memory. Erase some existing rules, then try to save rule again. (It is not necessary to re-enter the current rule.)
Low-high-low beeps	Cancel rule entry. Rule entry mode exited because of an error or the user asked to exit rule entry.
Host Specific	
USB only	
Four short high beeps	The digital scanner did not complete initialization. Wait several seconds and scan again.
Short low-short medium-short high beep sequence after scanning a USB device type	The digital scanner must establish communication with the bus before it can operate at the highest power level.
Short low-short medium-short high beep sequence occurs more than once	The USB bus can put the digital scanner in a state where power to the digital scanner is cycled on and off more than once. This is normal and usually happens when the PC cold boots.
RS-232 only	
Short high beep	A <BEL> character is received and Beep on <BEL> is enabled.
Low-high beeps	Entry error, wrong bar code scanned. Re-enter criterion or action. All previously entered criteria and actions are retained. Criteria or action list is too long for a rule.

LED Definitions

In addition to beeper sequences, the digital scanner uses a two-color LED to indicate its status. Table 2-2 explains LED sequences.

Table 2-2. LED Status Indications

LED	Indication
Standard Use	
Off	No power is applied to the digital scanner, or the digital scanner is on and ready to scan.
Green	The digital scanner successfully decoded a bar code.
Red	A data transmission error or digital scanner malfunction occurred.
Charging Use	
Green Slow Flash	The digital scanner is in the cradle and is charging in slow mode (occurs when the host cable powers the cradle).
Green Fast Flash	The digital scanner is in the cradle and is charging in rapid mode (occurs when an external power supply powers the cradle).
Red fast flash (two flashes per second)	Overcharge condition. Contact the Symbol Support Center.
Red slow flash (one flash per second)	Battery voltage not increasing with charge. Replace the battery.
Red and green flash	Temperature fault. Move the cradle to a location where the temperature is 0^{o} - 40^{o} C; optimal charging temperature is 5^{o} - 35^{o} C.

Digital Scanning

See *Chapter 1, Getting Started* to install and program the digital scanner. To scan:

1. Aim the digital scanner at the bar code.
2. Press the scan trigger.

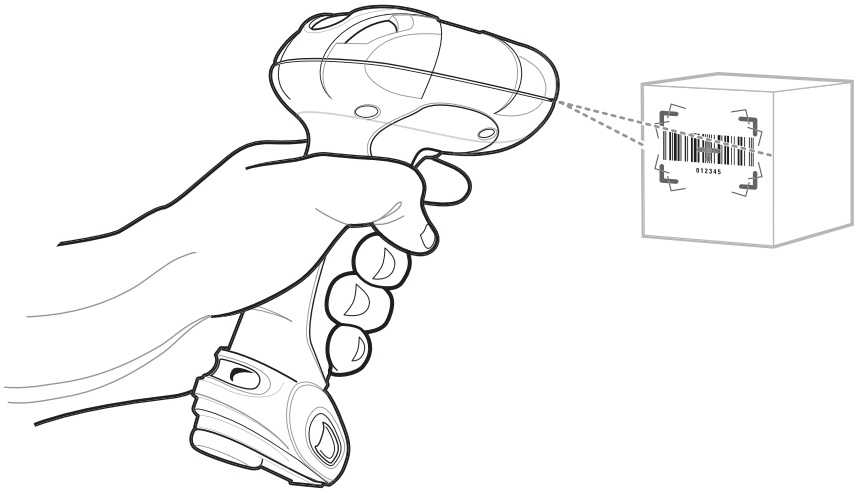


Figure 2-2. Aiming the Digital Scanner

The digital scanner projects a red laser aiming pattern (shown below) which allows positioning the bar code or object within the field of view.

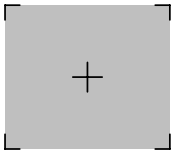


Figure 2-3. Laser Aiming Pattern

If necessary, the digital scanner turns on its red LEDs to illuminate the target bar code.

3. Center the symbol in any orientation within the aiming pattern. Be sure the entire symbol is within the rectangular area formed by the brackets in the pattern.

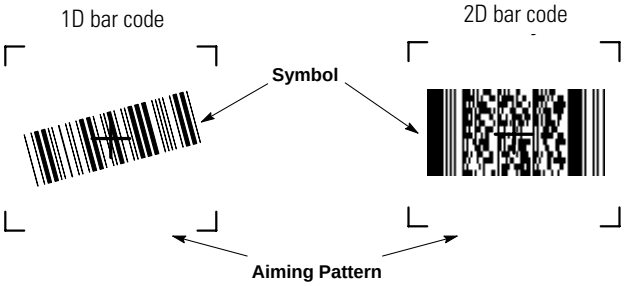


Figure 2-4. Centering Symbol in Aiming Pattern

4. Hold the trigger until the digital scanner beeps, indicating it has successfully decoded the bar code. For more information on beeper and LED definitions, see Table 2-1 and Table 2-2.

This process usually occurs instantaneously. Steps 2 - 4 are repeated on poor quality or difficult bar codes, until the bar code is decoded, the trigger is released, or the Decode Session Timeout is reached.

Aiming

Hold the digital scanner between two and nine inches (depending on symbol density; see *Decode Zones on page 2-9*) from the symbol, centering the aiming pattern cross hairs on the symbol.

The aiming pattern is smaller when the digital scanner is closer to the symbol and larger when it is farther from the symbol. Scan symbols with smaller bars or elements (mil size) closer to the digital scanner, and those with larger bars or elements (mil size) farther from the digital scanner.

The digital scanner can also read a bar code presented within the aiming pattern but not centered. The top examples in Figure 2-5 show acceptable aiming options, while the bottom examples can not be decoded.

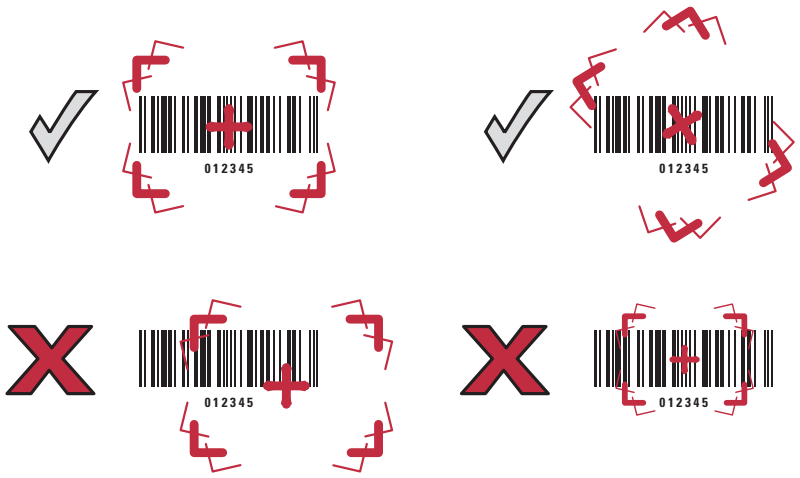
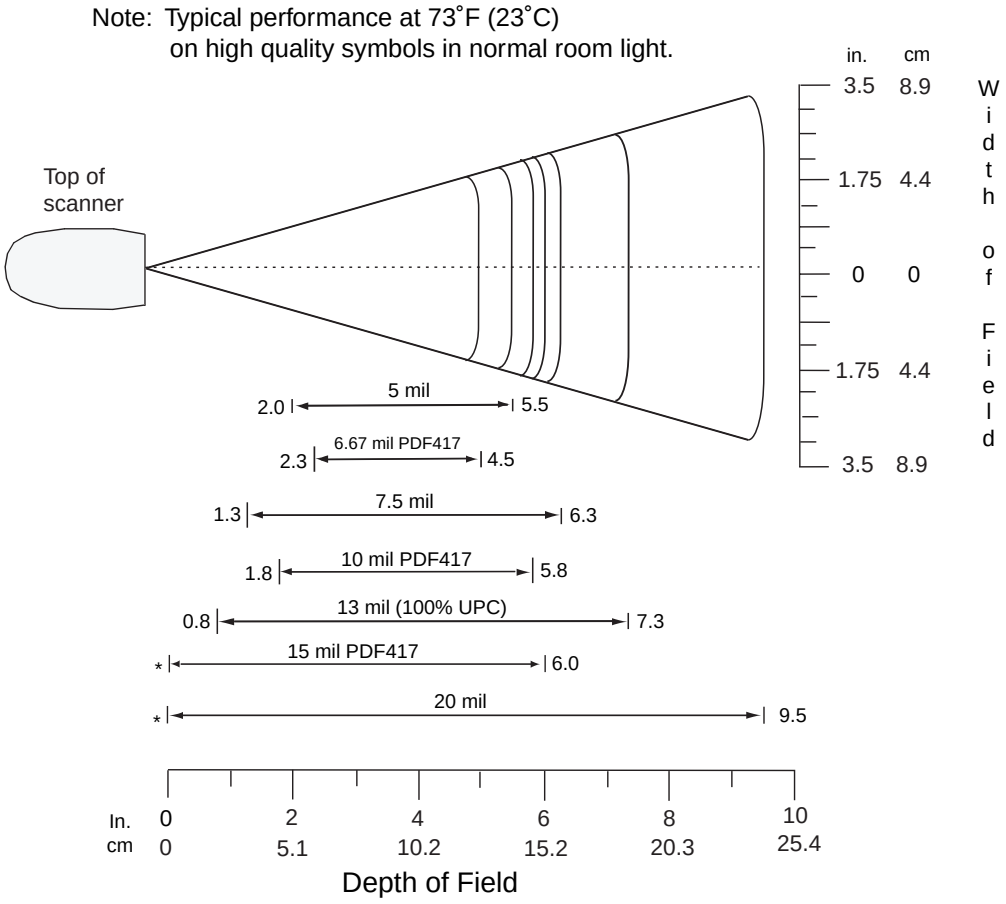


Figure 2-5. Acceptable and Incorrect Aiming

Decode Zones

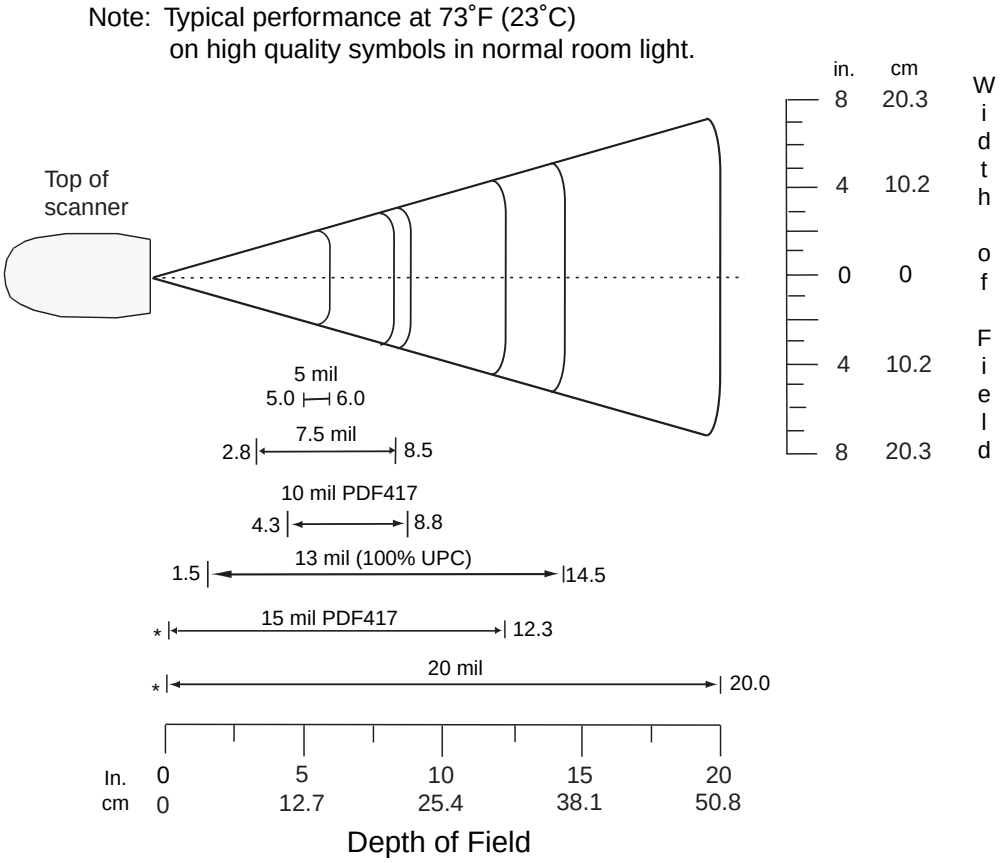
Near Focus



* Minimum distance determined by symbol length and scan angle.

Figure 2-6. DS 3478 Near Focus Decode Zone

Far Focus



* Minimum distance determined by symbol length and scan angle.

Figure 2-7. DS 3478 Far Focus Decode Zone

Smart Focus

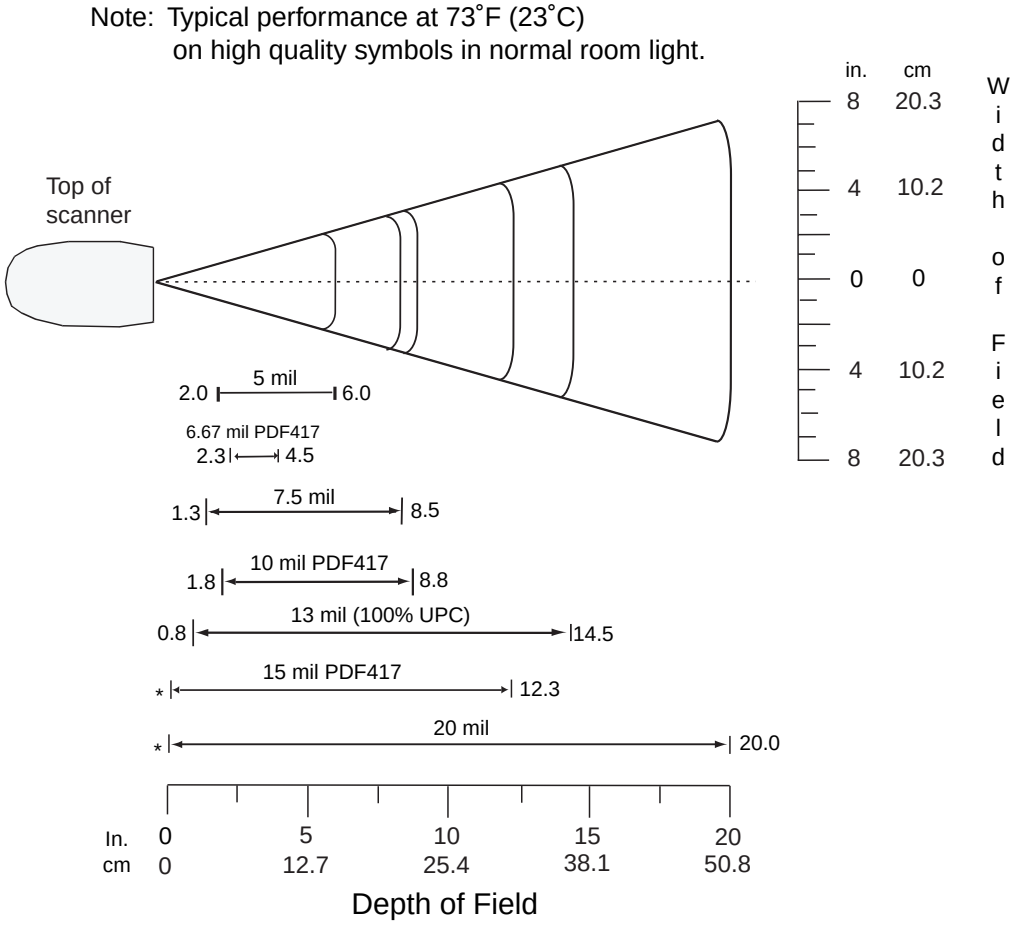


Figure 2-8. DS 3478 Smart Focus Decode Zone

3

Maintenance and Technical Specifications

Introduction 3-3
Maintenance 3-3
Troubleshooting 3-4
Technical Specifications 3-6
Digital Scanner Signal Descriptions 3-8

Introduction

This chapter provides digital scanner maintenance and troubleshooting information, technical specifications, and signal descriptions (pinouts).

Maintenance

Cleaning the scan window is the only maintenance required. A dirty window can affect scanning accuracy.

- Do not allow any abrasive material to touch the window.
- Remove any dirt particles with a damp cloth.
- Wipe the window using a tissue moistened with ammonia/water.
- Do not spray water or other cleaning liquids directly onto the window.

Troubleshooting

Table 3-1. Troubleshooting

Problem	Possible Causes	Possible Solutions
Nothing happens when the scan trigger is pressed.	No power to the digital scanner.	Check battery.
		Ensure that end cap to battery chamber is secured.
	The digital scanner is disabled.	For Synapse or IBM 468x mode, enable the digital scanner via the host interface. Otherwise, see the technical person in charge of scanning.
	If using RS-232 Nixdorf B mode, CTS is not asserted.	Assert CTS line.
	The aiming pattern is disabled.	Enable the aiming pattern. See *Decode Aiming Pattern on page 5-6*.
	Decoding illumination is disabled.	Enable illumination. See *Decoding Illumination on page 5-6*.
The digital scanner emits short low-short medium-short high beep sequence.	The digital scanner is powering up.	Normal when battery is inserted.
The digital scanner emits short high-short high-short low-short-low beep sequence.	Radio failure.	Cycle power to the cradle and re-attempt pairing.
The digital scanner emits the aiming pattern, but does not decode the bar code.	Digital scanner is not programmed for the correct bar code type.	Ensure the digital scanner is programmed to read the type of bar code being scanned.
	Bar code symbol is unreadable.	Check the symbol to ensure it is not defaced. Try scanning test bar codes of the same bar code type. See *Appendix C, Sample Bar Codes* for test bar codes.
	Bar code is out of range from the digital scanner.	Move digital scanner closer to or further from bar code.
	The symbol is not completely inside aiming pattern.	Move the symbol completely within the aiming pattern.
The digital scanner emits four short high beeps.	Battery is low.	Charge the battery. See *Charging the Battery on page 1-10*.
The digital scanner emits a disconnect (short high-short low) beep sequence.	The digital scanner disconnected from the cradle because it is too far from the cradle.	Move closer to the cradle and listen for a reconnection beep (short low-short high).
	The digital scanner disconnected from the cradle because the cradle lost power or was placed in USB suspend mode.	Check power connections to the cradle, and if using a USB cable, check to make sure the host computer has not entered a power save mode.
The digital scanner emits four long low beeps after scanning a bar code.	The cradle did not complete USB initialization.	Wait several seconds and scan again.
	The incorrect host interface cable is used.	Connect the correct host interface cable.
	The interface/power cables to the cradle are loose.	Secure all cable connections.
	The digital scanner is not paired to a cradle.	Scan the PAIR bar code on the cradle connected to the host that is to receive data.
	The digital scanner disconnected.	See previous disconnect beep sequence.
	A transmission error was detected.	Ensure the cradle's communication parameters match the host's setting.

Table 3-1. Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
The digital scanner decodes the bar code, but does not transmit the data to the host.	The digital scanner is not paired to the host-connected interface.	Pair the digital scanner to the cradle (using the PAIR bar code on the cradle).
	The cradle is not programmed for the correct host interface.	Check digital scanner host parameters or edit options.
	The interface cable is loose.	Secure all cable connections.
	The cradle lost connection to the host.	See *Reestablishing a Lost Connection to Host on page 1-8*.
The digital scanner emits five long low beeps after decoding a bar code.	A conversion error or format error occurred.	Properly configure the digital scanner's conversion parameters.
The host displays scanned data incorrectly.	The cradle's host communication parameters do not match the host's parameters.	Select the correct host.
		For RS-232, ensure the cradle's communication parameters match the host's settings.
		For a Keyboard Wedge configuration, program the system for the correct keyboard type, and turn off the CAPS LOCK key.
		Properly program editing options (e.g., UPC-E to UPC-A conversion).
The digital scanner emits short high-short high-short high-long low beep sequence when it is not in use.	RS-232 receive error.	Normal during host reset. Otherwise, ensure the digital scanner's RS-232 parity setting matches the host setting.
The digital scanner emits long low-long high beep sequence during programming.	Input error or **Cancel** bar code was scanned.	Scan the correct numeric bar codes within range for the parameter programmed.
The digital scanner emits short low-short high-short low-short high beep sequence during programming.	Out of ADF parameter storage space.	Erase all rules and re-program with shorter rules.
	Out of Synapse parameter storage space.	Scan **Set Synapse Defaults** bar code from the appropriate *Synapse Interface Guide* for cables no longer in use and re-program the digital scanner for the current host interface.
The digital scanner emits low-high-low beeps.	Clearing Code 39 buffer.	Normal when scanning the Code 39 Buffering **Clear Buffer** bar code or upon attempt to transmit an empty Code 39 buffer.
The digital scanner emits one short high beep when it is not in use.	In RS-232 mode, a <BEL> character is received.	Normal when **Beep on <BEL>** is enabled and the digital scanner is in RS-232 mode.
The digital scanner emits short low-short medium-short high beep sequence.	The digital scanner is powering up.	Normal when the battery is inserted.
The battery does not charge.	The cradle is outside the charging temperature range.	Charge within the recommended temperature of 32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal.
The battery door falls off.	The digital scanner was dropped.	Snap the battery door back in to reinstall.

If problems still occur, contact the distributor or call the local *Symbol Support Center*. See page xvii for the telephone numbers.

Technical Specifications

Table 3-2. Technical Specifications - DS 3478 Digital Scanner

Item	Description
Battery	Rechargeable Lithium-Ion 2200 mAh (3.7V)
Decode Capability	UPC/EAN, UPC/EAN with supplementals, UCC/EAN, JAN 8 & 13, 128, Code 39, Code 39 Full ASCII, Code 39 Trioptic, Codabar (NW7), Interleaved 2 of 5, Discrete 2 of 5, IATA 2 of 5, Code 128, Code 93, MSI, Code 11, Code 32, Coupon Code, Bookland EAN, RSS, US Postnet, US Planet, UK Postal, Japan Postal, Australia Postal, Dutch Postal, Composite Codes, PDF417, MicroPDF, Maxicode, Data Matrix (ECC 200), QR Code.
Beeper Operation	User-selectable: Enable, Disable
Beeper Volume	User-selectable: Three levels
Beeper Tone	User-selectable: Three tones
Yaw Tolerance	± 50° from nominal
Pitch Tolerance	± 60° from nominal
Roll Tolerance	± 180° from nominal
Print Contrast Minimum	25% minimum reflectance differential, measured at 650 nm.
Ambient Light Immunity	10,000 Ft Candles (107,600 Lux)
Durability	6.5 ft (2.0 m) drops to concrete
Operating Temperature	-4° to 122° F (-20° to 50° C)
Storage Temperature	-40° to 140° F (-40° to 60° C)
Charging Temperature	32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal
Humidity	5% to 95% (non-condensing)
ESD	15 kV air discharge 8 kV contact discharge
Weight	14.6 oz (414 grams)
Dimensions: Height Width Depth	 7.34 in. (18.65 cm) 4.82 in. (12.25 cm) 2.93 in. (7.43 cm)
Laser	650nm laser diode
Laser Classification	EN60950-1 1994 + A1:2002 + A2:2001 IEC60825-1 1993 + A1:1997 + A2:2001
Minimum Element Width	5 mil (0.127 mm)
Interfaces Supported	Keyboard Wedge, RS-232, USB, IBM 468X/469X, Wand Emulation, Scanner Emulation, Synapse, 123Scan
Radio Link	Bluetooth Class 1/Class 2 (2.4 GHz)
Electrical Safety	Certified to UL60950-1, CSA 22.2 No. 60950-1, EN60950-1/IEC60950-1
Input Transient Protection	EN301 489-1 Clause 9.4, EN301 489-17 Clause 6 Section 1
EMI	FCC Part 15 Class B, ICES-003 Class B, EN 55022 1994 A1:1995 + A2:1997, Japan VCCI

Table 3-3. Technical Specifications - STB 3478 Cradle

Item	Description
Power Requirements	4.75 - 14.0 VDC
Typical Current Draw	
Not Charging:	105 mA @ 5V 45 mA @ 9V
Fast Rate Charge:	955 mA @ 5V 660 mA @ 9V
Slow Rate Charge:	480 mA @ 5V 345 mA @ 9V
Interfaces Supported	Keyboard Wedge, RS-232, USB, IBM 468X/469X, Wand Emulation, Scanner Emulation, Synapse
Operating Temperature	-4° to 122° F (-20° to 50° C)
Storage Temperature	-40° to 140° F (-40° to 60° C)
Charging Temperature	32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal
Humidity	5% to 95% (non-condensing)
ESD	15 kV air discharge 8 kV contact discharge
Weight	10.5 oz (298 grams)
Dimensions: Height Width Depth	 9.5 in. (24.1 cm) 4.0 in (10.2 cm) 2.9 in (7.4 cm)
Radio Link	Bluetooth Class 1/Class 2 (2.4 GHz)
Electrical Safety	Certified to UL60950-1, CSA 22.2 No. 60950-1, EN60950-1/IEC60950-1
Input Transient Protection	EN301 489-1 Clause 9.4, EN301 489-17 Clause 6 Section 1
EMI	FCC Part 15 Class B, ICES-003 Class B, EN 55022 1994 A1:1995 + A2:1997, Japan VCCI

Digital Scanner Signal Descriptions

Figure 3-1 illustrates the positions of the cradle's host port pins.

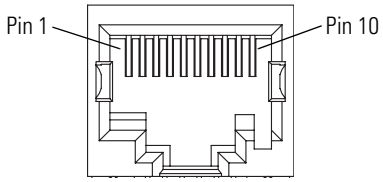


Figure 3-1. Cradle to Host Pin Assignments

The signal descriptions in Table 3-4 apply to the 10-pin RJ connector on the digital scanner cradle and are for reference only.

Table 3-4. Digital Scanner Cradle to Host Pin-outs

Pin	IBM	Synapse	RS-232	Keyboard Wedge	Wand	USB	Scanner Emulation
1	Reserved	SynClock	Reserved	Reserved	Reserved	Jump to Pin 6	DBP
2	Power	Power	Power	Power	Power	Power	Power
3	Ground	Ground	Ground	Ground	Ground	Ground	Ground
4	IBM_A(+)	Reserved	TxD	KeyClock	DBP	Reserved	SOS
5	Reserved	Reserved	RxD	TermData	CTS	D +	Decode
6	IBM_B(-)	SynData	RTS	KeyData	RTS	Jump to Pin 1	Trigger
7	Reserved	Reserved	CTS	TermClock	Reserved	D -	Enable
8	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
9	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
10	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Figure 3-2 illustrates the positions of the digital scanner's cradle port pins.

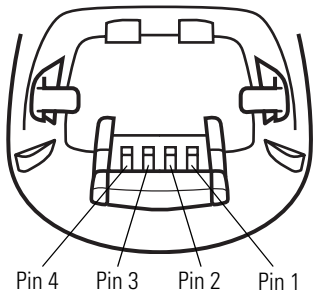


Figure 3-2. Cradle Pin Assignments

The signal descriptions in Table 3-5 apply to the connector from the digital scanner to the scanner cradle and are for reference only.

Table 3-5. Digital Scanner to Scanner Cradle Pin-outs

Pin	Description
1	VCC
2	CRADLE_TXD
3	CRADLE_RXD
4	GND

4

User Preferences

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User Preferences Default Parameters 4-4
User Preferences 4-5
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- Parameter Scanning 4-5
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Radio Communications 4-9
- Connection Maintenance Interval 4-9
- Radio Output Power 4-11
- Parameter Broadcast 4-11
- Single Point/Multipoint Operation 4-12

Introduction

This chapter describes each user preference feature and provides the programming bar codes for selecting these features for the digital scanner.

The digital scanner ships with the settings shown in the *User Preferences Default Table on page 4-4* (also see *Appendix A, Standard Default Parameters* for all host and miscellaneous defaults). If the default values suit the requirements, programming is not necessary.

Set feature values by scanning single bar codes or short bar code sequences. The settings are stored in non-volatile memory and are preserved when the digital scanner powers down.

The digital scanner communicates with the host through the digital scanner cradle. During setup, the digital scanner is paired with a cradle, which is connected to the host through one of several interfaces (see *Pairing on page 1-11* and the applicable host interface chapter). Each cradle can pair with up to four digital scanners.

If not using a Synapse or USB cable, select the host type (see the specific host chapter) after the digital scanner emits power-up beeps. This is only necessary upon the first power-up when connecting to a new host.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

To return all features to their default values, scan the *Set All Defaults* bar code on page 4-5. Throughout the programming bar code menus, default values are indicated with asterisks (*).

Scanning Sequence Examples

In most cases, scan only one bar code to set a parameter value. For example, to set the beeper tone to high, scan the **High Frequency** (beeper tone) bar code under *Beeper Tone on page 4-6*. The digital scanner issues a fast warble beep and the LED turns green, indicating a successful parameter entry.

Other parameters, such as **Decode Session Timeout**, require scanning several bar codes. See the parameter description for this procedure.

Errors While Scanning

Unless otherwise specified, if an error is made during a scanning sequence, re-scan the correct parameter.

User Preferences Default Parameters

Table 4-1 lists the defaults for user preference parameters. To change any option, scan the appropriate bar code(s) provided in *User Preferences on page 4-5*.

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

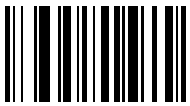
Table 4-1. User Preferences Default Table

Parameter	Default	Page Number
User Preferences		
Set Default Parameter	All Defaults	4-5
Parameter Scanning	Enable	4-5
Beeper Tone	Medium	4-6
Beeper Volume	High	4-6
Power Mode	Reduced	4-7
Beep After Good Decode	Enable	4-7
Decode Session Timeout	3.0 seconds	4-8
Fuzzy 1D Decoding	Enable	4-8
Connection Maintenance Interval	15 minutes	4-9
Radio Output Power	Bluetooth Class 1	4-11
Parameter Broadcast	Enable	4-11
Single Point/Multipoint Operation	Single Point	4-12

User Preferences

Set Default Parameter

Scan this bar code to return all parameters to the default values listed in *Table A-1 on page A-3*.



Set All Defaults

Parameter Scanning

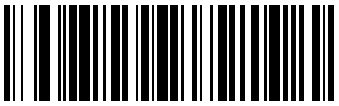
To disable decoding of parameter bar codes, scan the **Disable Parameter Scanning** bar code below. Note that the **Set Defaults** parameter bar code can still be decoded. To enable decoding of parameter bar codes, either scan **Enable Parameter Scanning** or **Set All Defaults**.

***Enable Parameter Scanning**

Disable Parameter Scanning

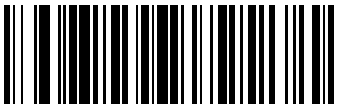
Beeper Tone

To select a decode beep frequency (tone), scan the **Low Frequency, Medium Frequency**, or **High Frequency** bar code.



Low Frequency

***Medium Frequency**



High Frequency

Beeper Volume

To select a beeper volume, scan the **Low Volume, Medium Volume**, or **High Volume** bar code.

Low Volume

Medium Volume

***High Volume**

Power Mode

This parameter determines whether or not the digital scanner enters reduced power mode after a decode attempt. When in reduced power mode, the digital scanner draws less current from its battery.

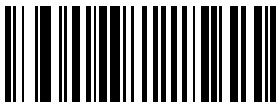
Continuous On

***Reduced Power Mode**

Beep After Good Decode

Scan one of the following bar codes to select whether the digital scanner beeps after a good decode. If **Do Not Beep After Good Decode** is selected, the beeper still operates during parameter menu scanning and indicates error conditions.

***Beep After Good Decode (Enable)**



Do Not Beep After Good Decode (Disable)

Decode Session Timeout

This parameter sets the maximum time decode processing continues during a scan attempt. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds. The default timeout is 3.0 seconds.

To set a Decode Session Timeout, scan the bar code below. Next, scan two numeric bar codes from *Appendix D, Numeric Bar Codes* that correspond to the desired on time. Single digit numbers must have a leading zero. For example, to set a Decode Session Timeout of 0.5 seconds, scan the bar code below, then scan the **0** and **5** bar codes. To correct an error or change the selection, scan **Cancel** on *page D-5*.

Decode Session Timeout

Fuzzy 1D Decoding

Enable this parameter to increase aggressiveness when decoding significantly damaged 1D symbols. Disabling this parameter reduces decode aggressiveness on such symbols, but increases decode aggressiveness on 2D symbols.

123Scan does not support this option.

***Enable Fuzzy 1D Decoding**

Disable Fuzzy 1D Decoding

Radio Communications

Connection Maintenance Interval

When a digital scanner disconnects from a cradle due to a Link Supervision Timeout, the digital scanner immediately attempts to reconnect to the cradle for 30 seconds. If the digital scanner does not reconnected within 30 seconds, it enters low power mode. Thereafter, when a bar code is scanned, the digital scanner attempts to reconnect before transmitting the data.

To guarantee that a disconnected digital scanner can reconnect when it comes back in range, the cradle reserves the connection for that digital scanner for a period of time defined by the Connection Maintenance Interval. If the cradle is already supporting the maximum four digital scanners, and one digital scanner disconnects, a fifth digital scanner cannot pair to the cradle during this interval. Connection Maintenance Interval options are:

- 15 minutes
- 30 minutes
- One hour
- Two hours
- Four hours
- Eight hours
- 24 hours
- Indefinitely.

Considerations

The system administrator determines the Connection Maintenance Interval. A shorter interval allows new users to gain access to abandoned connections more quickly, but causes problems if users leave the work area for extended periods. A longer interval allows existing users to leave the work area for longer periods of time, but ties up the system for new users.

To avoid this conflict, users who are going off-shift can scan the unpair bar code on page 4-12 to ignore the Connection Maintenance Interval and make the connection immediately available.

To set the Connection Maintenance Interval, select one of the following bar codes.

***Set Interval to 15 Minutes**

Set Interval to 30 Minutes

Connection Maintenance Interval (continued)

Set Interval to 60 Minutes

Set Interval to 2 Hours

Set Interval to 4 Hours

Set Interval to 8 Hours

Set Interval to 24 Hours

Set Interval to Forever

Radio Output Power

The DS 3478 uses a Class 1 Bluetooth radio with a transmission range of up to 100m. Optionally place the radio in Class 2 operating mode to restrict the transmission range to 10m and reduce the effect of the radio on neighboring wireless systems.

Scan a bar code to select Class 1 or Class 2 operation.

***Bluetooth Class 1**

Bluetooth Class 2

Parameter Broadcast

Enable Parameter Broadcast to broadcast all parameter bar codes scanned to all other digital scanners in the piconet. If disabled, parameter bar codes are processed by the individual digital scanner only, and the digital scanner ignores parameters broadcast from other digital scanners or from the cradle (e.g., parameters sent via 123Scan).

***Enable Parameter Broadcast**

Disable Parameter Broadcast

Single Point/Multipoint Operation

The cradle supports communication from up to four digital scanners simultaneously. This multipoint mode requires an external power supply to charge the digital scanners in the cradle. To power the cradle from the interface cable (either from the USB hub or from a power supply attached to the interface cable), place the cradle in single point mode. In single point mode, only one digital scanner can connect to the cradle at a time.

Note

When operating in bus-powered mode, the cradle must turn off the Bluetooth radio to charge the digital scanner. For this reason, only charge the digital scanner paired with the cradle in the cradle. Placing another digital scanner in the cradle for charging disrupts communication with the paired digital scanner.

When setting options while in multipoint mode, allow time for the setting changes to apply to all digital scanners.

To select single point or multipoint mode, scan the appropriate bar code.

Multipoint Mode

***Single Point Mode**

Unpair

Scan the following bar code to disconnect the digital scanner from its cradle.

Unpairing

Note

The *DS 3478 Quick Start Guide* also includes the unpairing bar code.

5

Decoding Preferences

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Scanning Sequence Examples 5-3
Errors While Scanning 5-3
Decoding Preferences Parameter Defaults 5-4
Decoding Preferences 5-5
- Focus Mode 5-5
- Decoding Illumination 5-6
- Decode Aiming Pattern 5-6

Introduction

If desired, program the digital scanner to perform various functions, or activate different features. This chapter describes digital scanner preference features and provides the programming bar codes for selecting these features.

The digital scanner ships with the settings shown in the *Decoding Preferences Default Table on page 5-4* (also see *Appendix A, Standard Default Parameters* for all host and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the digital scanner powers down.

The digital scanner communicates with the host through the digital scanner cradle. During setup, the digital scanner is paired with a cradle, which is connected to the host through one of several interfaces (see *Pairing on page 1-11* and the applicable host interface chapter). Each cradle can pair with up to four digital scanners.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connecting to a new host.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

To return all features to default values, scan the *Set Default Parameter* bar code on page 4-5. Throughout the programming bar code menus, default values are indicated with asterisks (*).

Scanning Sequence Examples

In most cases scanning one bar code sets the parameter value. For example, to disable the decode aiming pattern, scan the **Disable Decode Aiming Pattern** bar code listed under *Decode Aiming Pattern on page 5-6*. The digital scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters require scanning several bar codes. See these parameter descriptions for this procedure.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

Decoding Preferences Parameter Defaults

Table 5-1 lists defaults for digital scanner preference parameters. To change any option, scan the appropriate bar code(s) provided in *Decoding Preferences on page 5-5*.

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 5-1. Decoding Preferences Default Table

Parameter	Default	Page Number
Decoding Options		
Focus Mode	Far Focus	5-5
Decoding Illumination	Enable	5-6
Decode Aiming Pattern	Enable	5-6

Decoding Preferences

The parameters in this chapter control bar code decoding characteristics.

Focus Mode

Select the Focus Mode to control the working range of the digital scanner:

- Select **Far Focus** to optimize the digital scanner to read at its far position. Use this mode when scanning large bar codes in order to fit these bar codes in the digital scanner's field of view.
- Select **Near Focus** to optimize the digital scanner to read at its near position. Use this mode when scanning small, high-density bar codes.
- **Smart Focus** toggles the focus position after every frame. This mode is ideal for scanning a combination of small and large bar codes. Note that this mode can result in a slight loss of scanning aggressiveness as the digital scanner toggles between near and far focus.

***Far Focus**

Near Focus

Smart Focus

Decoding Illumination

Selecting **Enable Decoding Illumination** causes the digital scanner to flash illumination to aid decoding. Enabling illumination usually results in superior images. The effectiveness of the illumination decreases as the distance to the bar code increases.

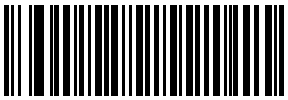
Select **Disable Decoding Illumination** to prevent the digital scanner from using decoding illumination, typical for outdoor scanning. Disabling this option extends battery life.

***Enable Decoding Illumination**

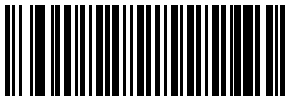
Disable Decoding Illumination

Decode Aiming Pattern

Select **Enable Decode Aiming Pattern** to project the aiming pattern during decoding, or **Disable Decode Aiming Pattern** to turn the aiming pattern off.



***Enable Decode Aiming Pattern**



Disable Decode Aiming Pattern

6

Keyboard Wedge Interface

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Keyboard Wedge Default Parameters 6-5
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- Ignore Unknown Characters 6-9
- Keystroke Delay 6-9
- Intra-Keystroke Delay 6-10
- Alternate Numeric Keypad Emulation 6-10
- Caps Lock On 6-11
- Caps Lock Override 6-11
- Convert Wedge Data 6-12
- Function Key Mapping 6-12
- FN1 Substitution 6-13
- Send Make and Break 6-13

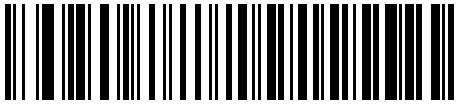
Keyboard Maps 6-14
ASCII Character Set 6-16

Introduction

This chapter provides instructions for programming the digital scanner for the keyboard wedge host interface, used to connect the digital scanner between the keyboard and host computer. The digital scanner translates the bar code data into keystrokes, and transmits the information to the host computer via the cradle interface. The host computer accepts the keystrokes as if they originated from the keyboard.

This interface adds bar code reading functionality to a system designed for manual keyboard input. In this mode the keyboard keystrokes are simply passed through.

Throughout the programming bar code menus, default values are indicated with asterisks (*****).



Connecting a Keyboard Wedge Interface

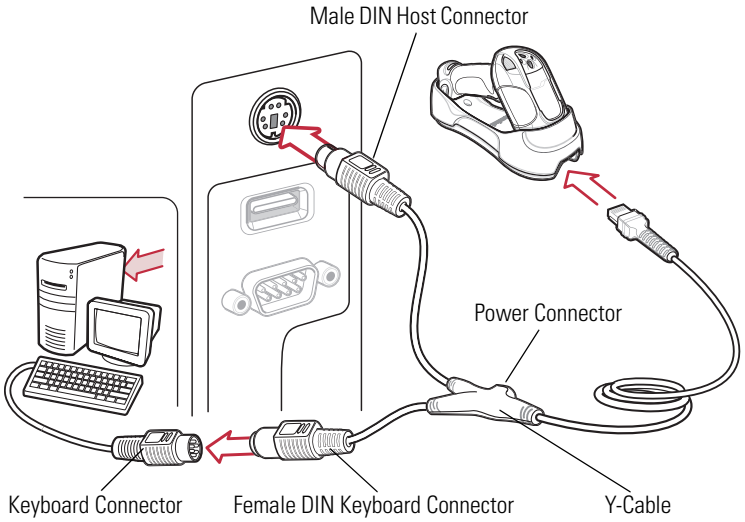


Figure 6-1. Keyboard Wedge Interface Connection with Y-cable

To connect the keyboard wedge interface Y-cable:

1. Turn off the host computer and unplug the keyboard connector.
2. Attach the modular connector of the Y-cable to the cable interface port on the digital scanner cradle. See *Connecting the Cradle on page 1-6*.
3. Connect the round male DIN host connector of the Y-cable to the keyboard port on the host computer.
4. Connect the round female DIN keyboard connector of the Y-cable to the keyboard connector.
5. If required, attach the optional power supply to the power connector on the Y-cable.
6. Ensure all connections are secure.
7. Turn on the host system.
8. Pair the digital scanner to the cradle by scanning the bar code on the cradle.
9. Select the keyboard wedge host type by scanning the appropriate bar code from *Keyboard Wedge Host Types on page 6-6*.
10. To modify any other parameter options, scan the appropriate bar codes in this chapter.
11. Connect an external power supply if required.

Note

Interface cables vary depending on configuration. The connectors may be different from those illustrated in Figure 6-1, but the steps to connect the digital scanner cradle remain the same.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

Keyboard Wedge Default Parameters

Table 6-1 lists the defaults for keyboard wedge host parameters. To change any option, scan the appropriate bar code(s) provided in this chapter.

Note

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

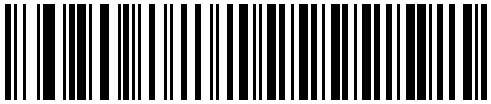
Table 6-1. Keyboard Wedge Host Default Table

Parameter	Default	Page Number
Keyboard Wedge Host Parameters		
Keyboard Wedge Host Type	IBM PC/AT& IBM PC Compatibles	6-6
Keyboard Wedge Country Types (Country Codes)	North American	6-7
Ignore Unknown Characters	Enable	6-9
Keystroke Delay	0 msec (No Delay)	6-9
Intra-Keystroke Delay	Disable	6-10
Alternate Numeric Keypad Emulation	Disable	6-10
Caps Lock On	Disable	6-11
Caps Lock Override	Disable	6-11
Convert Wedge Data	Do Not Convert Wedge Data	6-12
Function Key Mapping	Disable	6-13
FN1 Substitution	Disable	6-13
Send Make and Break	Send Make and Break Scan Codes	6-13

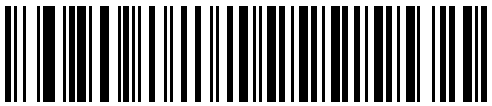
Keyboard Wedge Parameters

Keyboard Wedge Host Types

Select the keyboard wedge host by scanning one of the following bar codes.



***IBM PC/AT & IBM PC Compatibles**

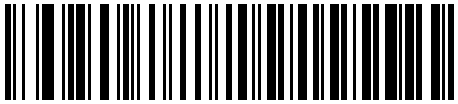


IBM AT Notebook

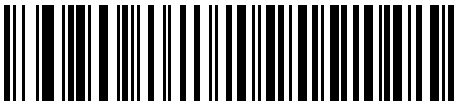
NCR 7052

Keyboard Wedge Country Types (Country Codes)

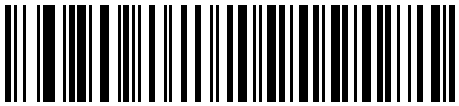
Scan the bar code corresponding to the keyboard type. If the particular keyboard type is not listed, see *Alternate Numeric Keypad Emulation on page 6-10*.



***North American**

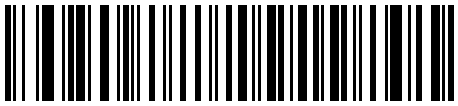


German Windows



French Windows

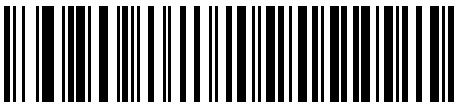
French Canadian Windows 95/98



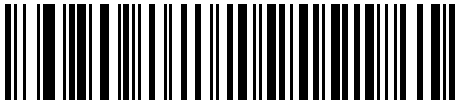
French Canadian Windows XP/2000

Spanish Windows

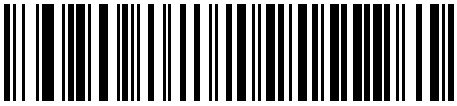
Keyboard Wedge Country Types (Country Codes) (continued)



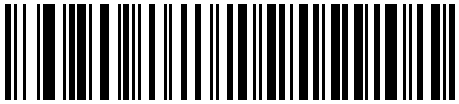
Italian Windows



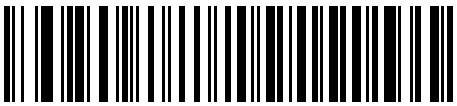
Swedish Windows



UK English Windows



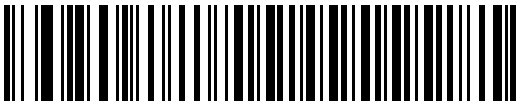
Japanese Windows



Brazilian-Portuguese Windows

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and the digital scanner emits no error beeps. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent until the first unknown character is encountered, and the digital scanner emits an error beep.

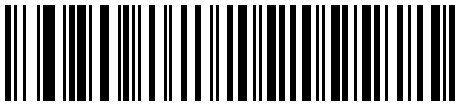


***Send Bar Codes with Unknown Characters (Enable)**

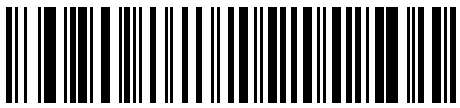
Do Not Send Bar Codes with Unknown Characters (Disable)

Keystroke Delay

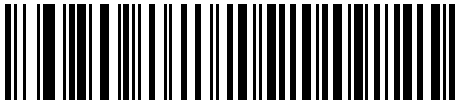
This is the delay in milliseconds between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower data transmission.



***0 msec (No Delay)**



20 msec (Medium Delay)



40 msec (Long Delay)

Intra-Keystroke Delay

Enable Intra-Keystroke Delay to insert an additional delay between each emulated key press and release. This also sets the Keystroke Delay parameter to a minimum of 5 msec.

Enable Intra-Keystroke Delay

***Disable Intra-Keystroke Delay**

Alternate Numeric Keypad Emulation

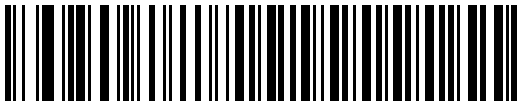
This allows emulation of most other country keyboard types not listed in *Keyboard Wedge Country Types (Country Codes) on page 6-7* in a Microsoft® operating system environment.

Enable Alternate Numeric Keypad

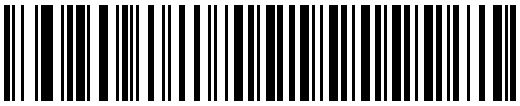
***Disable Alternate Numeric Keypad**

Caps Lock On

When enabled, the digital scanner emulates keystrokes as if the Caps Lock key is always pressed.



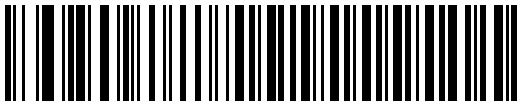
Enable Caps Lock On



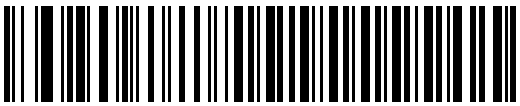
***Disable Caps Lock On**

Caps Lock Override

When enabled, on AT or AT Notebook hosts, the keyboard ignores the state of the Caps Lock key and matches the case (upper or lower) of the sent character. Therefore, an upper case 'A' in the bar code is sent as an upper case 'A,' and a lower case 'a' in the bar code is sent as a lower case 'a,' no matter what the state of the keyboard's Caps Lock key.



Enable Caps Lock Override

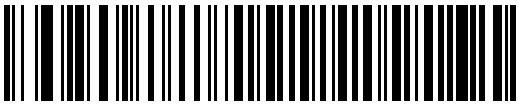


***Disable Caps Lock Override**

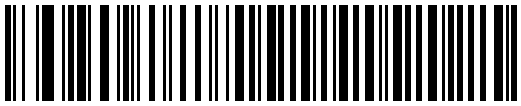
If both Caps Lock On and Caps Lock Override are enabled, Caps Lock Override takes precedence.

Convert Wedge Data

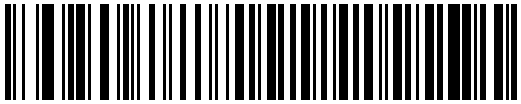
When enabled, the digital scanner converts all bar code data to the selected case.



Convert Wedge Data to Upper Case



Convert Wedge Data to Lower Case



***Do Not Convert Wedge Data**

Function Key Mapping

ASCII values under 32 are normally sent as control key sequences (see *Table 6-2 on page 6-16*). Enable this parameter to send the keys shown in bold in the table, in place of the standard key mapping. Table entries that do not have a bold entry remain the same regardless of this parameter.

Enable Function Key Mapping

***Disable Function Key Mapping**

FN1 Substitution

When enabled, this parameter replaces any FN1 character in an EAN128 bar code with a keystroke chosen by the user. See *FN1 Substitution Values on page 14-7*.

Enable FN1 Substitution

***Disable FN1 Substitution**

Send Make and Break

When enabled, the scan codes for releasing a key are not sent.

***Send Make and Break Scan Codes**

Send Make Scan Code Only

Keyboard Maps

The following keyboard maps are provided for prefix/suffix keystroke parameters. To program the prefix/suffix values, see the bar codes on page 14-5.

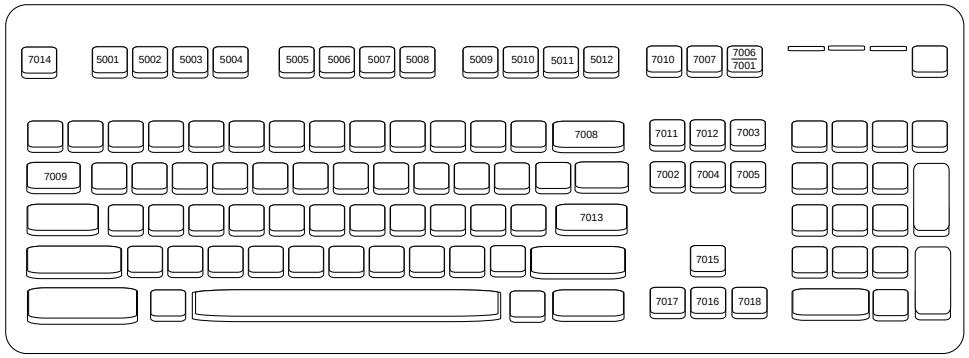


Figure 6-2. IBM PS2 Type Keyboard

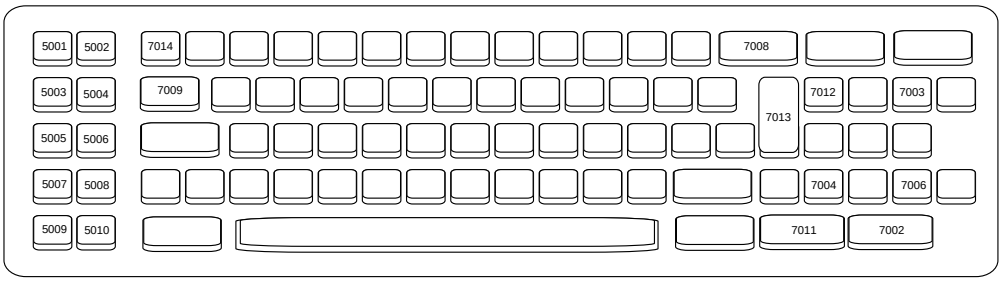


Figure 6-3. IBM PC/XT

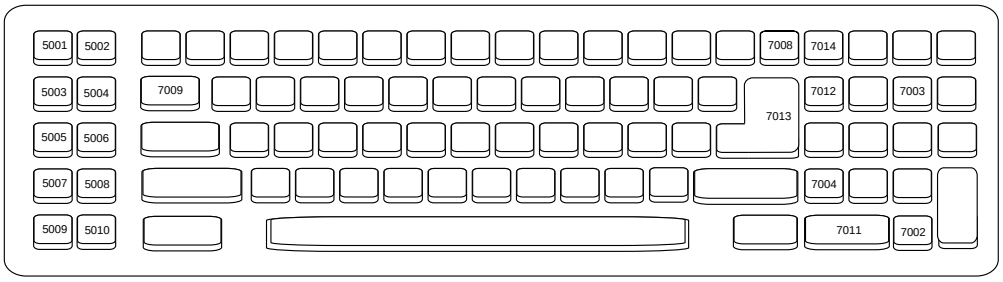


Figure 6-4. IBM PC/AT

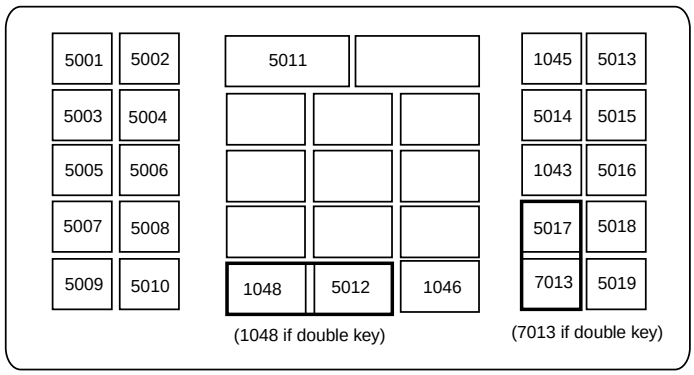


Figure 6-5. NCR 7052 32-KEY

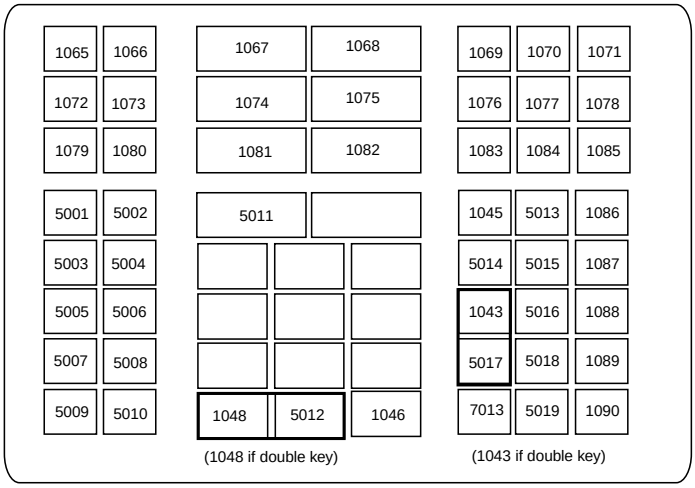


Figure 6-6. NCR 7052 58-KEY

ASCII Character Set

Note

Code 39 Full ASCII interprets the bar code special character ($ + % /) preceding a Code 39 character and assigns an ASCII character value to the pair. For example, when Code 39 Full ASCII is enabled and a **+B** is scanned, it is interpreted as **b**, **%J** as **?**, and **%V** as **@**. Scanning **ABC%I** outputs the keystroke equivalent of **ABC >**.

Table 6-2. Keyboard Wedge ASCII Character Set

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1001	$A	CTRL A
1002	$B	CTRL B
1003	$C	CTRL C
1004	$D	CTRL D
1005	$E	CTRL E
1006	$F	CTRL F
1007	$G	CTRL G
1008	$H	CTRL H/**BACKSPACE**[1]
1009	$I	CTRL I/**HORIZONTAL TAB**[1]
1010	$J	CTRL J
1011	$K	CTRL K
1012	$L	CTRL L
1013	$M	CTRL M/**ENTER**[1]
1014	$N	CTRL N
1015	$O	CTRL O
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [/**ESC**[1]

[1]The keystroke in bold is sent only if Function Key Mapping is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=

Table 6-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_

Table 6-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1096	%W	‘
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~

Table 6-3. Keyboard Wedge ALT Key Character Set

ALT Keys	Keystroke
2065	ALT A
2066	ALT B
2067	ALT C
2068	ALT D
2069	ALT E
2070	ALT F
2071	ALT G
2072	ALT H
2073	ALT I
2074	ALT J
2075	ALT K
2076	ALT L
2077	ALT M
2078	ALT N
2079	ALT O
2080	ALT P
2081	ALT Q
2082	ALT R
2083	ALT S
2084	ALT T
2085	ALT U
2086	ALT V
2087	ALT W
2088	ALT X
2089	ALT Y
2090	ALT Z

Table 6-4. Keyboard Wedge GUI Key Character Set

GUI Keys	Keystrokes
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4

Table 6-4. Keyboard Wedge GUI Key Character Set (Continued)

GUI Keys	Keystrokes
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z

Table 6-5. Keyboard Wedge F Key Character Set

F Keys	Keystroke
5001	F1
5002	F2
5003	F3
5004	F4
5005	F5
5006	F6
5007	F7
5008	F8
5009	F9
5010	F10
5011	F11
5012	F12
5013	F13
5014	F14
5015	F15
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24

Table 6-6. Keyboard Wedge Numeric Keypad Character Set

Numeric Keypad	Keystroke
6042	*
6043	+
6044	undefined
6045	-
6046	.
6047	/
6048	0
6049	1
6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table 6-7. Keyboard Wedge Extended Keypad Character Set

Extended Keypad	Keystroke
7001	Break
7002	Delete
7003	Pg Up
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Dn Arrow
7017	Left Arrow
7018	Right Arrow

7

RS-232 Interface

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ASCII Character Set 7-22

Introduction

This chapter provides instructions for programming the digital scanner to interface with an RS-232 host. The RS-232 interface is used to attach the digital scanner cradle to point-of-sale devices, host computers, or other devices with an available RS-232 port (i.e., COM port).

If the particular host is not listed in Table 7-2, set the communication parameters to match the host device. Refer to the documentation for the host device.

Note

This digital scanner uses TTL RS-232 signal levels, which interface with most system architectures. For system architectures requiring RS-232C signal levels, Symbol offers different cables providing the TTL to RS-232C conversion. Contact the *Symbol Support Center* for more information.

Throughout the bar code menus, default values are indicated with asterisks (*).

Connecting an RS-232 Interface

This connection is made directly from the digital scanner cradle to the host computer.

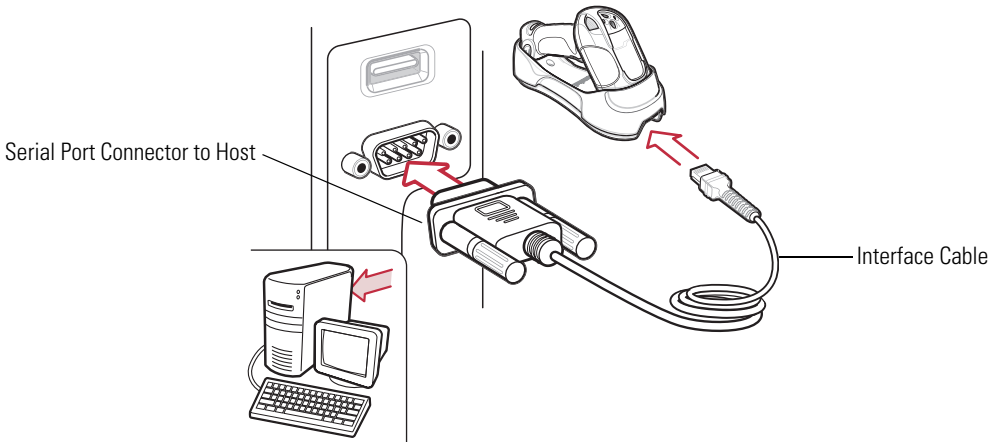


Figure 7-1. RS-232 Direct Connection

Note

Interface cables vary depending on configuration. The connectors may be different from those illustrated in Figure 7-1, but the steps to connect the digital scanner cradle remain the same.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

1. Attach the modular connector of the RS-232 interface cable to the cable interface port on the digital scanner cradle. See *Connecting the Cradle on page 1-6*.
2. Connect the other end of the RS-232 interface cable to the serial port on the host computer.
3. Connect the power supply to the serial connector end of the RS-232 interface cable, then plug the power supply to an appropriate outlet, or connect an external power supply to the cradle.
4. Ensure all connections are secure.
5. Pair the digital scanner to the cradle by scanning the bar code on the cradle.
6. Select the RS-232 host type by scanning the appropriate bar code from *RS-232 Host Types on page 7-8*.
7. To modify any other parameter options, scan the appropriate bar codes in this chapter.

RS-232 Default Parameters

Table 7-1 lists the defaults for RS-232 host parameters. To change any option, scan the appropriate bar code(s) provided in the parameter descriptions section beginning on page 7-6.

Note

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 7-1. RS-232 Host Default Table

Parameter	Default	Page Number
RS-232 Host Parameters		
RS-232 Host Types	Standard RS-232	7-8
Baud Rate	9600	7-10
Parity	None	7-11
Check Receive Errors	Enable	7-12
Stop Bit Select	1 Stop Bit	7-12
Data Bits	8-Bit	7-13
Hardware Handshaking	None	7-14
Software Handshaking	None	7-16
Host Serial Response Time-out	Minimum: 2 sec	7-17
RTS Line State	Host: Low RTS	7-18
Beep on <BEL>	Disable	7-18
Intercharacter Delay	Minimum: 0 msec	7-19
Nixdorf Beep/LED Options	Normal Operation	7-20
Ignore Unknown Characters	Send Bar Code	7-21

RS-232 Host Parameters

Various RS-232 host types are set up with their own parameter default settings. Selecting the host type sets the parameter defaults as listed in Table 7-2.

Table 7-2. Terminal Specific RS-232

Parameter	**Standard RS-232** (Default)	**ICL**	**Wincor-Nixdorf Mode A**	**Wincor-Nixdorf Mode B**	**Olivetti**	**Omron**	**OPOS/ JPOS**	**Fujitsu**
Transmit Code ID	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Transmission Format	Data as is	Data/ Suffix	Data/Suffix	Data/Suffix	Prefix/Data/ Suffix	Data/Suffix	Data/Suffix	Data/ Suffix
Suffix	CR/LF (7013)	CR (1013)	CR (1013)	CR (1013)	ETX (1002)	CR (1013)	CR (1013)	CR (1013)
Baud Rate	9600	9600	9600	9600	9600	9600	9600	9600
Parity	None	Even	Odd	Odd	Even	None	Odd	None
Hardware Handshaking	None	RTS/CTS Option 3	RTS/CTS Option 3	RTS/CTS Option 3	None	None	RTS/CTS Option 3	None
Software Handshaking	None	None	None	None	Ack/Nak	None	None	None
Serial Response Time-out	2 Sec.	9.9 Sec.	9.9 Sec.	9.9 Sec.	9.9 Sec.	9.9 Sec.	9.9 Sec.	2 Sec.
Stop Bit Select	One	One	One	One	One	One	One	One
ASCII Format	8-Bit	8-Bit	8-Bit	8-Bit	7-Bit	8-Bit	8-Bit	8-Bit
Beep On <BEL>	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
RTS Line State	Low	High	Low	Low = No data to send	Low	High	Low = No data to send	Low
Prefix	None	None	None	None	STX (1003)	None	None	None
*In the Nixdorf Mode B or OPOS/JPOS, if CTS is Low, scanning is disabled. When CTS is High, the user can scan bar codes.								
**If Nixdorf Mode B or OPOS/JPOS is scanned without the digital scanner connected to the proper host, it may appear unable to scan. If this happens, scan a different RS-232 host type within 5 seconds of cycling power to the digital scanner.								

RS-232 Host Parameters (continued)

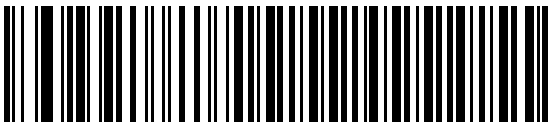
Selecting the ICL, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, Olivetti, Omron, OPOS/JPOS, or Fujitsu host type enables the transmission of code ID characters listed in Table 7-3. These code ID characters are not programmable and are separate from the Transmit Code ID feature. Do not enable the Transmit Code ID feature for these terminals.

Table 7-3. Terminal Specific Code ID Characters

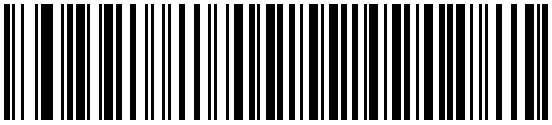
	ICL	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B	Olivetti	Omron	OPOS/JPOS	Fujitsu
UPC-A	A	A	A	A	A	A	A
UPC-E	E	C	C	C	E	C	E
EAN-8/JAN-8	FF	B	B	B	FF	B	FF
EAN-13/JAN-13	F	A	A	A	F	A	F
Code 39	C <len>	M	M	M <len>	C <len>	M	None
Codabar	N <len>	N	N	N <len>	N <len>	N	None
Code 128	L <len>	K	K	K <len>	L <len>	K	None
I 2 of 5	I <len>	I	I	I <len>	I <len>	I	None
Code 93	None	L	L	L <len>	None	L	None
D 2 of 5	H <len>	H	H	H <len>	H <len>	H	None
UCC/EAN 128	L <len>	P	P	P <len>	L <len>	P	None
MSI	None	O	O	O <len>	None	O	None
Bookland EAN	F	A	A	A	F	A	F
Trioptic	None	None	None	None	None	None	None
Code 11	None	None	None	None	None	None	None
IATA	H<len>	H	H	None	None	H	None
Code 32	None	None	None	None	None	None	None

RS-232 Host Types

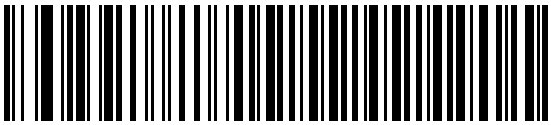
To select an RS-232 host type, scan one of the following bar codes.



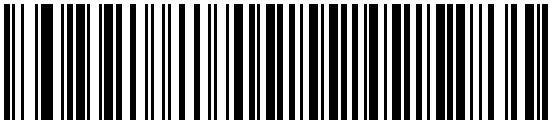
***Standard RS-232**



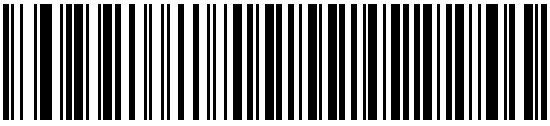
ICL RS-232



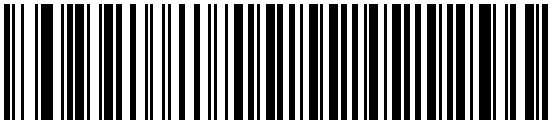
Wincor-Nixdorf RS-232 Mode A



Wincor-Nixdorf RS-232 Mode B

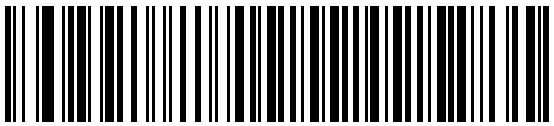


Olivetti ORS4500

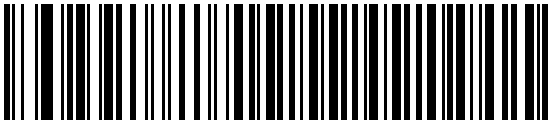


Omron

RS-232 Host Types (continued)



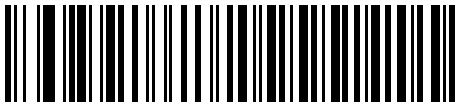
OPOS/JPOS



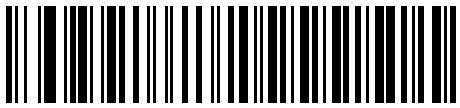
Fujitsu RS-232

Baud Rate

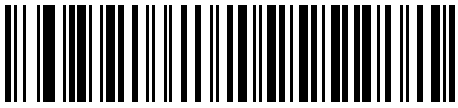
Baud rate is the number of bits of data transmitted per second. Set the digital scanner's baud rate to match the baud rate setting of the host device. Otherwise, data may not reach the host device or may reach it in distorted form.



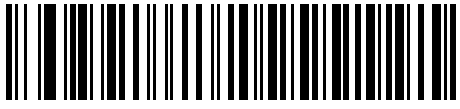
Baud Rate 600



Baud Rate 1200

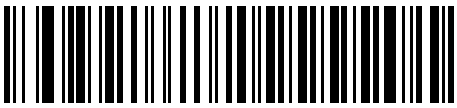


Baud Rate 2400

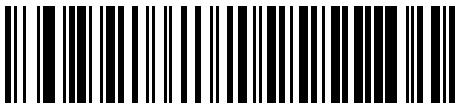


Baud Rate 4800

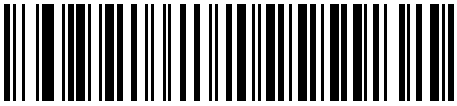
Baud Rate (continued)



***Baud Rate 9600**



Baud Rate 19,200

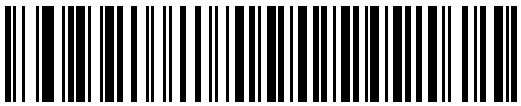


Baud Rate 38,400

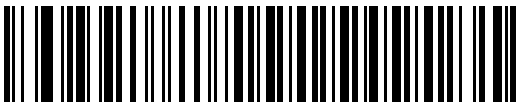
Parity

A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements.

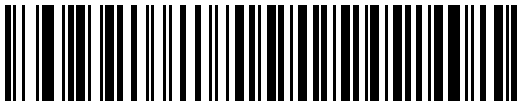
- Select **Odd** parity to set the parity bit value to 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.
- Select **Even** parity to set the parity bit value to 0 or 1, based on data, to ensure that an even number of 1 bits are contained in the coded character.
- Select **Mark** parity and the parity bit is always 1.
- Select **Space** parity and the parity bit is always 0.
- Select **None** when no parity bit is required.



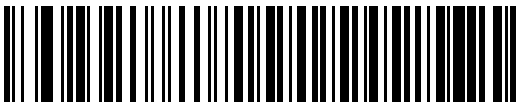
Odd



Even



Mark

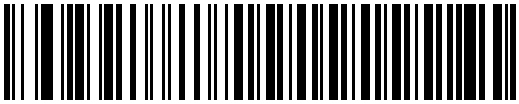


Space

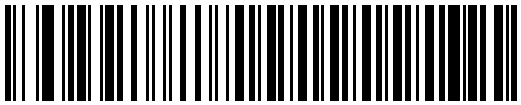
***None**

Check Receive Errors

Select whether or not to check the parity, framing, and overrun of received characters. The parity value of received characters is verified against the parity parameter selected previously.



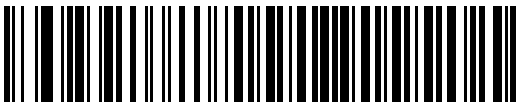
***Check For Received Errors (Enable)**



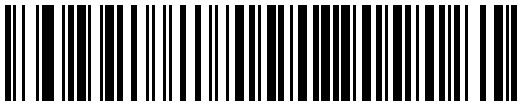
Do Not Check For Received Errors (Disable)

Stop Bit Select

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving device for the next character in the serial data stream. The number of stop bits selected (one or two) depends on the number the receiving terminal is programmed to accommodate. Set the number of stop bits to match host device requirements.



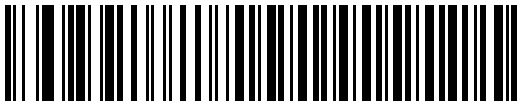
***1 Stop Bit**



2 Stop Bits

Data Bits

This parameter allows the digital scanner to interface with devices requiring a 7-bit or 8-bit ASCII protocol.



7-Bit

***8-Bit**

Hardware Handshaking

The data interface consists of an RS-232 port designed to operate either with or without the hardware handshaking lines *Request to Send* (RTS) and *Clear to Send* (CTS).

If Standard RTS/CTS handshaking is not selected, scan data is transmitted as it becomes available. If Standard RTS/CTS handshaking is selected, scan data is transmitted according to the following sequence:

- The digital scanner reads the CTS line for activity. If CTS is asserted, the digital scanner waits up to the Host Serial Response Time-out for the host to de-assert the CTS line. If the CTS line is still asserted after the Host Serial Response Time-out expires (default), the digital scanner sounds a transmit error and discards any scanned data.
- When the CTS line is de-asserted, the digital scanner asserts the RTS line and waits up to the Host Serial Response Time-out for the host to assert CTS. When the host asserts CTS, the digital scanner transmits data. If the CTS line is still de-asserted after Host Serial Response Time-out expires (default), the digital scanner sounds a transmission error and discards the data.
- When data transmission is complete, the digital scanner de-asserts RTS 10 msec after sending the last character.
- The host responds by de-asserting CTS. The digital scanner checks for a de-asserted CTS upon the next data transmission.

During data transmission, the CTS line should be asserted. If CTS is de-asserted for more than 50 ms between characters, the digital scanner aborts transmission, sounds a transmission error, and discards the data.

If this communications sequence fails, the digital scanner issues an error indication and discards the data. Rescan the data.

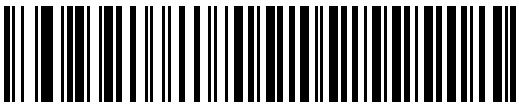
If hardware handshaking and software handshaking are both enabled, hardware handshaking takes precedence.

The DTR signal is jumpered (set) to the active state.

Hardware Handshaking (continued)

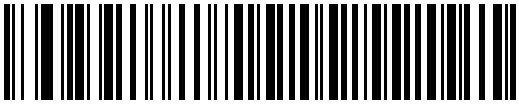
Scan a bar code to select one of the following hardware handshaking options:

- **None** - Scan the bar code below if no hardware handshaking is desired.
- **Standard RTS/CTS** - Scan the bar code below to select Standard RTS/CTS hardware handshaking.
- **RTS/CTS Option 1** - The digital scanner asserts RTS before transmitting and ignores the state of CTS. The digital scanner de-asserts RTS when the transmission is complete.
- **RTS/CTS Option 2** - RTS is always high or low (user-programmed logic level). However, the digital scanner waits for CTS to be asserted before transmitting data. If CTS is not asserted within Host Serial Response Time-out (default), the digital scanner issues an error indication and discards the data.
- **RTS/CTS Option 3** - The digital scanner asserts RTS before data transmission, regardless of the state of CTS. The digital scanner waits up to Host Serial Response Time-out (default) for CTS to be asserted. If CTS is not asserted during this time, the digital scanner issues an error indication and discards the data. The digital scanner de-asserts RTS when transmission is complete.



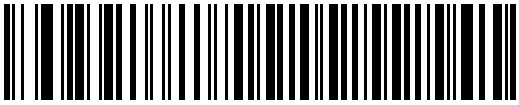
***None**

Standard RTS/CTS



RTS/CTS Option 1

RTS/CTS Option 2



RTS/CTS Option 3

Software Handshaking

This parameter offers control of the data transmission process in addition to, or instead of, that offered by hardware handshaking. There are five options.

If software handshaking and hardware handshaking are both enabled, hardware handshaking takes precedence.

None

When this option is selected, data is transmitted immediately. No response is expected from the host.

ACK/NAK

When this option is selected, after transmitting data, the digital scanner expects either an ACK or NAK response from the host. When a NAK is received, the digital scanner transmits the same data again and waits for either an ACK or NAK. After three unsuccessful attempts to send data when NAKs are received, the digital scanner issues an error indication and discards the data.

The digital scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the digital scanner does not get a response in this time, it issues an error indication and discards the data. There are no retries when a time-out occurs.

ENQ

When this option is selected, the digital scanner waits for an ENQ character from the host before transmitting data. If an ENQ is not received within the Host Serial Response Time-out, the digital scanner issues an error indication and discards the data. The host must transmit an ENQ character at least every Host Serial Response Time-out to prevent transmission errors.

ACK/NAK with ENQ

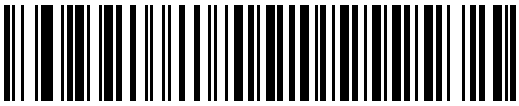
This combines the two previous options. For re-transmissions of data, due to a NAK from the host, an additional ENQ is not required.

XON/XOFF

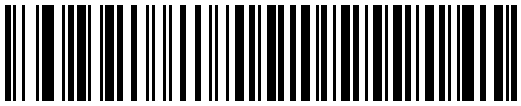
An XOFF character turns the digital scanner transmission off until the digital scanner receives an XON character. There are two situations for XON/XOFF:

- XOFF is received before the digital scanner has data to send. When the digital scanner has data to send, it waits up to Host Serial Response Time-out for an XON character before transmission. If the XON is not received within this time, the digital scanner issues an error indication and discards the data.
- XOFF is received during a transmission. Data transmission then stops after sending the current byte. When the digital scanner receives an XON character, it sends the rest of the data message. The digital scanner waits up to 30 seconds for the XON.

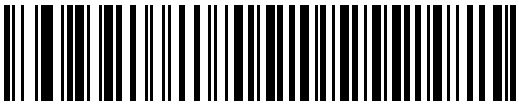
Software Handshaking (continued)



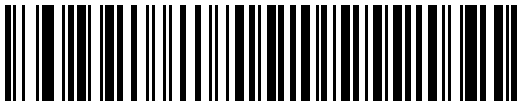
***None**



ACK/NAK



ENQ



ACK/NAK with ENQ

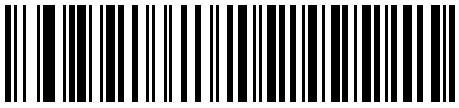
XON/XOFF

Host Serial Response Time-out

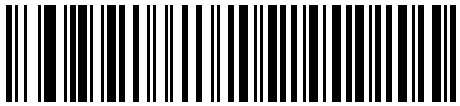
This parameter specifies how long the digital scanner waits for an ACK, NAK, or CTS before determining that a transmission error has occurred. This only applies when in one of the ACK/NAK software handshaking modes, or RTS/CTS hardware handshaking mode.

Note

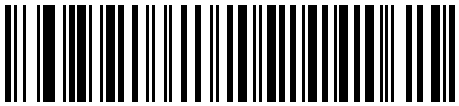
This parameter does not apply to the Wincor-Nixdorf RS-232 Mode A/B and the OPOS/JPOS host types.



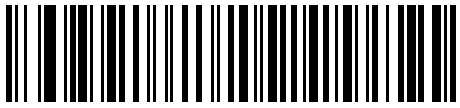
***Minimum: 2 sec**



Low: 2.5 Sec



Medium: 5 Sec

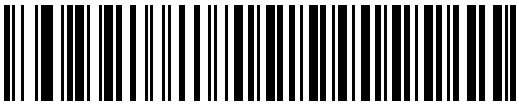


High: 7.5 Sec

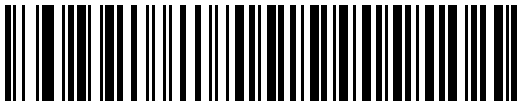
Maximum: 9.9 Sec

RTS Line State

This parameter sets the idle state of the Serial Host RTS line. Scan a bar code below to select the **Low RTS** or **High RTS** line state.



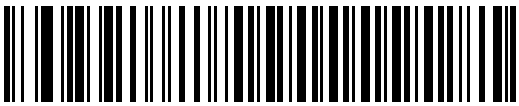
***Host: Low RTS**



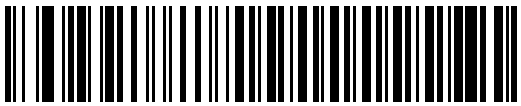
Host: High RTS

Beep on <BEL>

When this parameter is enabled, the digital scanner issues a beep when a <BEL> character is detected on the RS-232 serial line. <BEL> is issued to indicate an illegal entry or other important event.



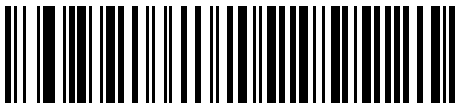
Beep On <BEL> Character (Enable)



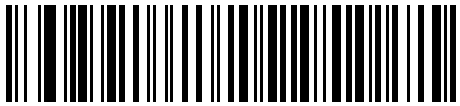
***Do Not Beep On <BEL> Character (Disable)**

Intercharacter Delay

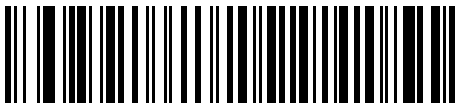
This parameter specifies the intercharacter delay inserted between character transmissions.



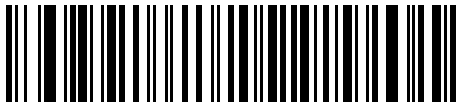
***Minimum: 0 msec**



Low: 25 msec



Medium: 50 msec



High: 75 msec

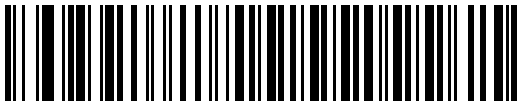
Maximum: 99 msec

Nixdorf Mode A/B and OPOS/JPOS Beep/LED Options

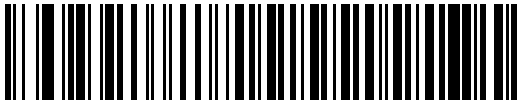
When Nixdorf Mode A, Nixdorf Mode B, or OPOS/JPOS is selected, this parameter indicates when the digital scanner beeps and turns on its LED after a decode.

Note

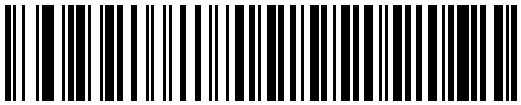
The **Beep/LED After CTS Pulse** option is not valid when Nixdorf Mode A is selected.



***Normal Operation**
(Beep/LED Immediately After Decode)



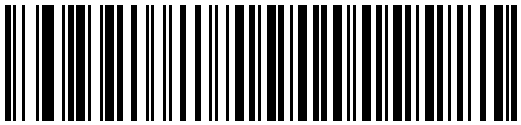
Beep/LED After Transmission



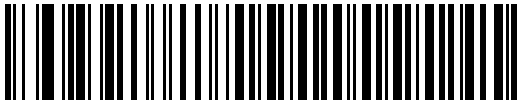
Beep/LED After CTS Pulse

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes with Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the digital scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent up to the first unknown character and then an error beep sounds on the digital scanner.



***Send Bar Code with Unknown Characters (Enable)**



Do Not Send Bar Codes with Unknown Characters (Disable)

ASCII Character Set

Assign the values in Table 7-4 as prefixes or suffixes for ASCII character data transmission.

Table 7-4. RS-232 ASCII Character Set

ASCII Value	Full ASCII Code 39 Encode Character	ASCII Character
1000	%U	NUL
1001	$A	SOH
1002	$B	STX
1003	$C	ETX
1004	$D	EOT
1005	$E	ENQ
1006	$F	ACK
1007	$G	BELL
1008	$H	BCKSPC
1009	$I	HORIZ TAB
1010	$J	LF/NW LN
1011	$K	VT
1012	$L	FF
1013	$M	CR/ENTER
1014	$N	SO
1015	$O	SI
1016	$P	DLE
1017	$Q	DC1/XON
1018	$R	DC2
1019	$S	DC3/XOFF
1020	$T	DC4
1021	$U	NAK
1022	$V	SYN
1023	$W	ETB
1024	$X	CAN
1025	$Y	EM
1026	$Z	SUB
1027	%A	ESC
1028	%B	FS
1029	%C	GS
1030	%D	RS
1031	%E	US
1032	Space	Space
1033	/A	!

Table 7-4. RS-232 ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	ASCII Character
1034	/B	"
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	'
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1057	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E

Table 7-4. RS-232 ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	ASCII Character
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i

Table 7-4. RS-232 ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	ASCII Character
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~
1127		Undefined
7013		ENTER

8

USB Interface

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ASCII Character Set 8-13

Introduction

This chapter provides instructions for programming the digital scanner to interface with a USB host. The digital scanner cradle connects directly to a USB host, or a powered USB hub. The USB host can power the cradle and recharge the digital scanner battery, but this charging method has limitations. See *Using the Host to Supply Power on page 1-7*.

Throughout the programming bar code menus, default values are indicated with asterisks (*).

Connecting a USB Interface

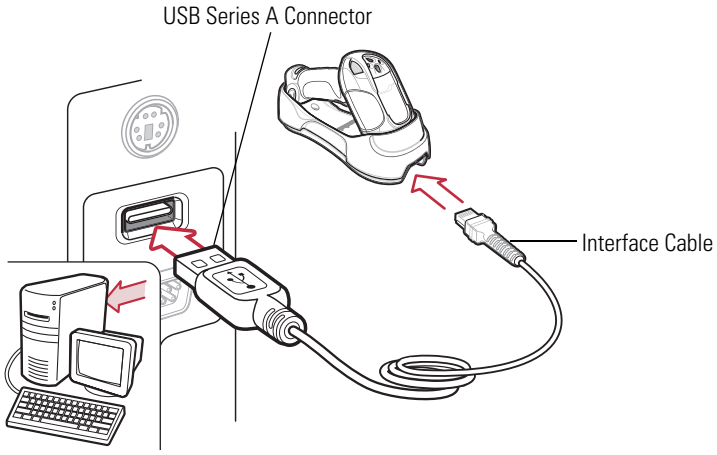


Figure 8-1. USB Connection

The digital scanner cradle connects with USB-capable hosts including:

- Desktop PCs and notebooks
- Apple™ iMacs, Power Mac G4s and G5s, iBooks (North America only), PowerBooks
- IBM SurePOS terminals
- Sun, IBM, and other network computers that support more than one keyboard.

The following operating systems support the digital scanner through USB:

- Windows® 98, 2000, ME, XP
- Mac OS 8.5 and above
- IBM 4690 OS.

The digital scanner cradle also interfaces with other USB hosts which support USB Human Interface Devices (HID). For more information on USB technology, hosts, and peripheral devices, visit *http://www.symbol.com/usb*.

To connect the digital scanner cradle to a USB host:

1. Attach the modular connector of the USB interface cable to the cable interface port on the digital scanner. See *Connecting the Cradle on page 1-6*.
2. Plug the series A connector into the USB host or hub, or plug the Plus Power connector into an available port of the IBM SurePOS terminal.
3. Ensure all connections are secure.
4. Pair the digital scanner to the cradle by scanning the bar code on the cradle.
5. Select the USB device type by scanning the appropriate bar code from *USB Device Type on page 8-6*.
6. On first installation when using Windows, the software displays a prompt to select or install the Human Interface Device driver. To install this driver, provided by Windows, click **Next** through all the choices and click **Finished** on the last choice. The digital scanner powers up during this installation.
7. To modify any other parameter options, scan the appropriate bar codes in this chapter.
8. Connect an external power supply if required.

Interface cables vary depending on configuration. The connectors may be different from those illustrated in Figure 8-1, but the steps to connect the digital scanner cradle remain the same.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

If problems occur, see *Troubleshooting on page 3-4*.

USB Default Parameters

Table 8-1 lists the defaults for USB host parameters. To change any option, scan the appropriate bar code(s) provided in the parameter descriptions section beginning on page 8-6.

Note

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 8-1. USB Host Default Table

Parameter	Default	Page Number
USB Host Parameters		
USB Device Type	HID Keyboard Emulation	8-6
USB Country Keyboard Types (Country Codes)	North American	8-7
USB Keystroke Delay	No Delay (0 msec)	8-9
USB Caps Lock Override	Disable	8-9
USB Ignore Unknown Characters	Enable	8-10
Emulate Keypad	Disable	8-10
USB Keyboard FN1 Substitution	Disable	8-11
Function Key Mapping	Disable	8-11
Simulated Caps Lock	Disable	8-12
Convert Case	No Case Conversion	8-12

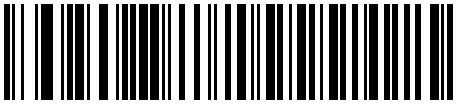
USB Host Parameters

USB Device Type

Select the desired USB device type.

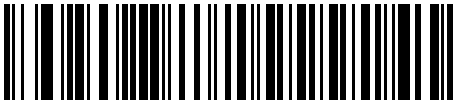
Note

When changing USB device types, the digital scanner disconnects and reconnects as the cradle re-enumerates on the USB bus.



***HID Keyboard Emulation**

IBM Table Top USB



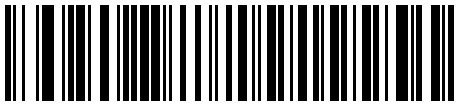
IBM Hand-Held USB

USB Country Keyboard Types (Country Codes)

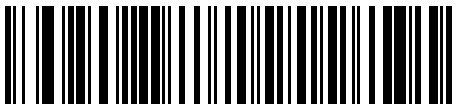
Scan the bar code corresponding to the keyboard type. This setting applies only to the USB HID Keyboard Emulation device.

Note

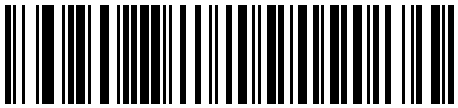
When changing USB Country Keyboard Types, the digital scanner disconnects and reconnects as the cradle re-enumerates on the USB bus.



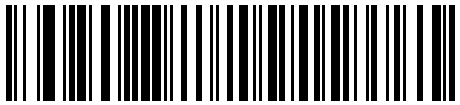
***North American Standard USB Keyboard**



German Windows



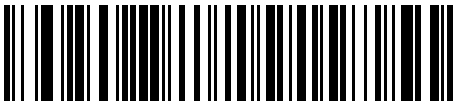
French Windows



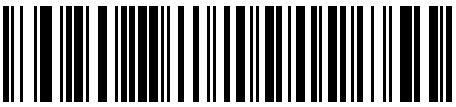
French Canadian Windows 95/98

French Canadian Windows 2000/XP

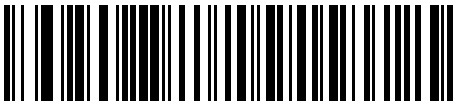
USB Country Keyboard Types (Country Codes) (continued)



Spanish Windows

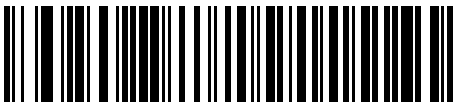


Italian Windows



Swedish Windows

UK English Windows

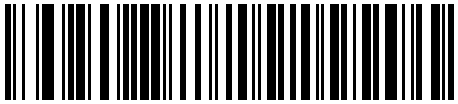


Japanese Windows (ASCII)

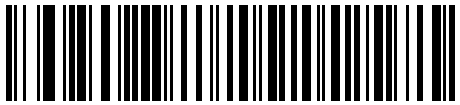
Brazilian-Portuguese Windows

USB Keystroke Delay

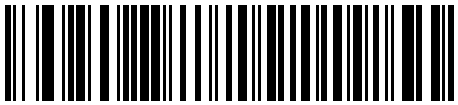
This parameter sets the delay, in milliseconds, between emulated keystrokes. Scan a bar code below to increase the delay when hosts require slower data transmission.



***No Delay (0 msec)**



Medium Delay (20 msec)



Long Delay (40 msec)

USB Caps Lock Override

This option applies only to the HID Keyboard Emulation device. When enabled, the case of the data is preserved regardless of the state of the caps lock key. This setting is always enabled for the Japanese, Windows (ASCII) keyboard type and can not be disabled.

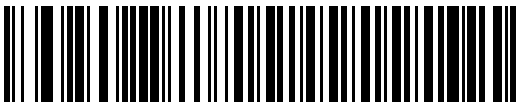
Override Caps Lock Key (Enable)

***Do Not Override Caps Lock Key (Disable)**

USB Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the host, and an error beep sounds.

***Send Bar Codes with Unknown Characters (Enable)**

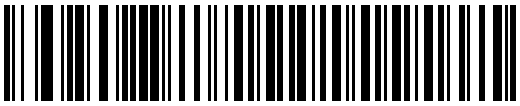


Do Not Send Bar Codes with Unknown Characters (Disable)

Emulate Keypad

When enabled, all characters are sent as ASCII sequences over the numeric keypad. For example ASCII A is sent as "ALT make" 0 6 5 "ALT Break."

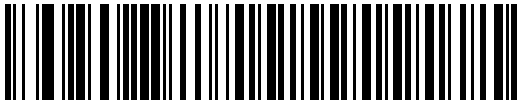
***Disable Keypad Emulation**



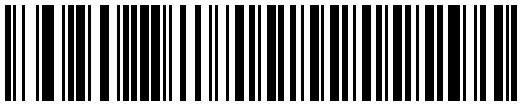
Enable Keypad Emulation

USB Keyboard FN1 Substitution

This option applies only to the USB HID Keyboard Emulation device. When enabled, this replaces any FN1 characters in an EAN 128 bar code with a Key Category and a selected value. See *FN1 Substitution Values on page 14-7* to set the Key Category and Key Value.



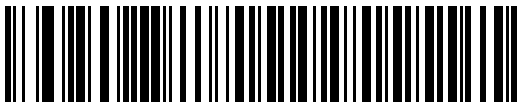
Enable USB Keyboard FN 1 Substitution



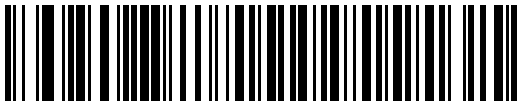
***Disable USB Keyboard FN 1 Substitution**

Function Key Mapping

ASCII values under 32 are normally sent as control-key sequences (see Table 8-2 on page 8-13). When this parameter is enabled, the keys shown in bold in the table are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same regardless of this parameter.



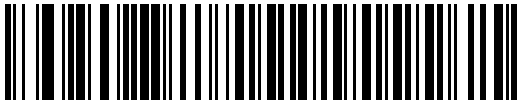
***Disable Function Key Mapping**



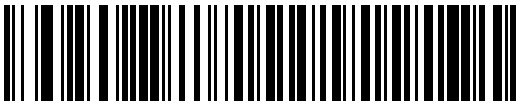
Enable Function Key Mapping

Simulated Caps Lock

When enabled, the digital scanner inverts upper and lower case characters on the scanned bar code as if the Caps Lock state is enabled on the keyboard. This inversion is done regardless of the keyboard's Caps Lock state.



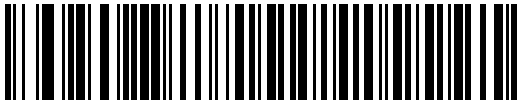
***Disable Simulated Caps Lock**



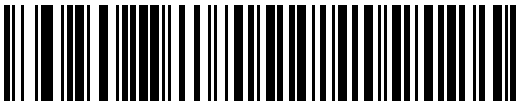
Enable Simulated Caps Lock

Convert Case

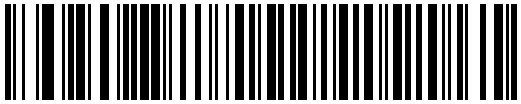
When enabled, the digital scanner converts all bar code data to the selected case.



***No Case Conversion**



Convert All to Upper Case



Convert All to Lower Case

ASCII Character Set

Table 8-2. USB ASCII Character Set

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1000	%U	CTRL 2
1001	$A	CTRL A
1002	$B	CTRL B
1003	$C	CTRL C
1004	$D	CTRL D
1005	$E	CTRL E
1006	$F	CTRL F
1007	$G	CTRL G
1008	$H	CTRL H/**BACKSPACE**[1]
1009	$I	CTRL I/**HORIZONTAL TAB**[1]
1010	$J	CTRL J
1011	$K	CTRL K
1012	$L	CTRL L
1013	$M	CTRL M/**ENTER**[1]
1014	$N	CTRL N
1015	$O	CTRL O
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [/**ESC**[1]
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6

[1]The keystroke in bold is sent only if Function Key Mapping is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2. USB ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	"
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	'
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A

Table 8-2. USB ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d

Table 8-2. USB ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~

Table 8-3. USB ALT Key Character Set

ALT Keys	Keystroke
2064	ALT 2
2065	ALT A
2066	ALT B
2067	ALT C
2068	ALT D
2069	ALT E
2070	ALT F
2071	ALT G
2072	ALT H
2073	ALT I
2074	ALT J
2075	ALT K
2076	ALT L
2077	ALT M
2078	ALT N
2079	ALT O
2080	ALT P
2081	ALT Q
2082	ALT R
2083	ALT S
2084	ALT T
2085	ALT U
2086	ALT V
2087	ALT W
2088	ALT X
2089	ALT Y
2090	ALT Z

Table 8-4. USB GUI Key Character Set

GUI Key	Keystroke
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V
Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.	

Table 8-4. USB GUI Key Character Set (Continued)

GUI Key	Keystroke
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z
Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.	

Table 8-5. USB F Key Character Set

F Keys	Keystroke
5001	F1
5002	F2
5003	F3
5004	F4
5005	F5
5006	F6
5007	F7
5008	F8
5009	F9
5010	F10
5011	F11
5012	F12
5013	F13
5014	F14
5015	F15
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24

Table 8-6. USB Numeric Keypad Character Set

Numeric Keypad	Keystroke
6042	*
6043	+
6044	undefined
6045	-
6046	.
6047	/
6048	0
6049	1
6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table 8-7. USB Extended Keypad Character Set

Extended Keypad	Keystroke
7001	Break
7002	Delete
7003	PgUp
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Down Arrow
7017	Left Arrow
7018	Right Arrow

9

IBM 468X/469X Interface

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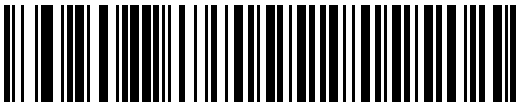
Connecting to an IBM 468X/469X Host 9-4
IBM Default Parameters 9-5
IBM 468X/469X Host Parameters 9-6
    Port Address 9-6
    Convert Unknown to Code 39 9-6

Introduction

This chapter provides instructions for programming the digital scanner to interface with an IBM 468X/469X host computer.

Throughout the programming bar code menus, default values are indicated with asterisks (*).



Connecting to an IBM 468X/469X Host

This connection is made directly from the digital scanner cradle to the host interface.

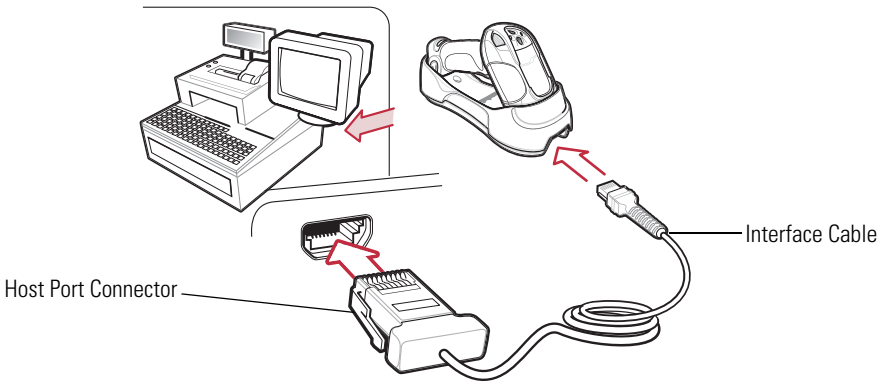


Figure 9-1. IBM Direct Connection

Note

Interface cables vary depending on configuration. The connectors may be different from those illustrated in Figure 9-1, but the steps to connect the digital scanner cradle remain the same.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

1. Connect the modular connector of the IBM 46XX interface cable to the cable interface port on the digital scanner cradle. See *Connecting the Cradle on page 1-6*.
2. Connect the other end of the IBM 46XX interface cable to the appropriate port on the host computer (typically Port 9).
3. Ensure all connections are secure.
4. Pair the digital scanner to the cradle by scanning the bar code on the cradle.
5. Select the port address by scanning the appropriate bar code from *Port Address on page 9-6*.
6. To modify other parameter options, scan the appropriate bar codes in this chapter.
7. Connect an external power supply if required.

Note

The only required configuration is the port address. Most other digital scanner parameters are typically controlled by the IBM system.

IBM Default Parameters

Table 9-1 lists the defaults for IBM host parameters. To change any option, scan the appropriate bar code(s) provided in the parameter descriptions section beginning on page 9-6.

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 9-1. IBM Host Default Table

Parameter	Default	Page Number
IBM 468X/469X Host Parameters		
Port Address	None Selected	9-6
Convert Unknown to Code 39	Disable	9-6

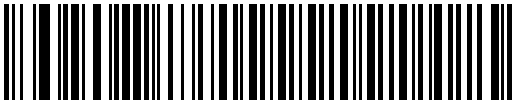
IBM 468X/469X Host Parameters

Port Address

Use this parameter to set the IBM 468X/469X port.

Note

Scanning one of these bar codes enables the RS-485 interface on the digital scanner.



Hand-held Scanner Emulation (Port 9B)

Non-IBM Scanner Emulation (Port 5B)

Table-top Scanner Emulation (Port 17)

Convert Unknown to Code 39

Scan one of the following bar codes to enable or disable the conversion of unknown bar code type data to Code 39.

Convert Unknown to Code 39 (Enable)

***Do Not Convert Unknown to Code 39 (Disable)**

10

Wand Emulation Interface

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Connecting a Wand Emulation Interface 10-4
Wand Emulation Default Parameters 10-5
Wand Emulation Host Parameters 10-6
- Wand Emulation Host Types 10-6
- Leading Margin (Quiet Zone) 10-7
- Polarity 10-8
- Ignore Unknown Characters 10-8
- Convert All to Code 39 10-9
- Convert Code 39 to Full ASCII 10-9

Introduction

This chapter provides instructions for programming the digital scanner to interface with a wand emulation host. This mode is used whenever wand emulation communication is needed. The digital scanner cradle connects either to an external wand decoder or to a decoder integrated in a portable terminal or Point-of-Sale (POS) terminal.

In this mode the digital scanner emulates the signal of a digital wand to make it "readable" by a wand decoder.

Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***Transmit Unknown Characters** — Feature/Option

Connecting a Wand Emulation Interface

To perform wand emulation, connect the digital scanner cradle to a portable data terminal, or a controller that collects the wand data and interprets it for the host.

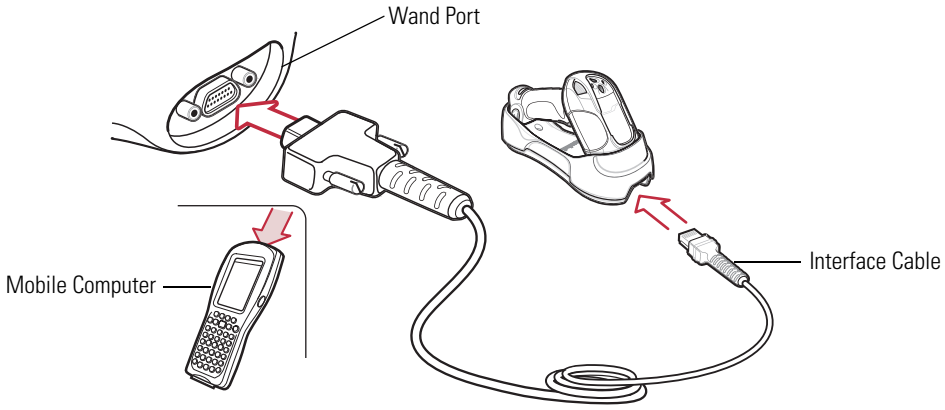


Figure 10-1. Wand Emulation Connection

Note

Interface cables vary depending on configuration. The connectors may be different from those illustrated in Figure 10-1, but the steps to connect the digital scanner cradle remain the same.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

1. Attach the modular connector of the wand emulation interface cable to the cable interface port on the digital scanner cradle. See *Connecting the Cradle on page 1-6*.
2. Connect the other end of the wand emulation interface cable to the wand port on the mobile computer or controller.
3. Ensure all connections are secure.
4. Pair the digital scanner to the cradle by scanning the bar code on the cradle.
5. Select the wand emulation host type by scanning the appropriate bar code from *Wand Emulation Host Types on page 10-6*.
6. To modify other parameter options, scan the appropriate bar codes in this chapter.
7. Connect an external power supply if required.

WARNING

Connect the cradle to a 5 volt decoder only. Connecting to a 12 volt decoder can cause damage and invalidate the warranty.

Wand Emulation Default Parameters

Table 10-1 lists the defaults for wand emulation host types. To change any option, scan the appropriate bar code(s) provided in this chapter.

Note

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 10-1. Wand Emulation Default Table

Parameter	Default	Page Number
Wand Emulation Host Parameters		
Wand Emulation Host Types	Symbol OmniLink Interface Controller	10-6
Leading Margin	80 msec	10-7
Polarity	Bar High/Margin Low	10-8
Ignore Unknown Characters	Enable	10-8
Convert All to Code 39	Disable	10-9
Convert Code 39 to Full ASCII	Disable	10-9

Wand Emulation Host Parameters

Wand Emulation Host Types

Select the wand emulation host by scanning one of the bar codes below.

Symbol OmniLink Interface Controller

Symbol PDT Terminal (MSI)

Symbol PTC Terminal (Telxon)

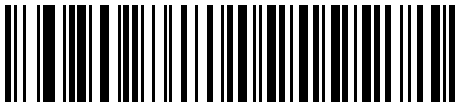
Leading Margin (Quiet Zone)

Scan a bar code below to select a leading margin duration. A leading margin is the time that precedes the first bar of the scan, in milliseconds. The minimum allowed value is 80 msec and the maximum is 250 msec. This parameter is used to accommodate older wand decoders that cannot handle short leading margins.

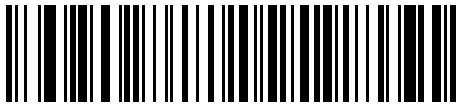
Note

250 msec is the maximum value that this parameter can attain, however, 200 msec is sufficient.

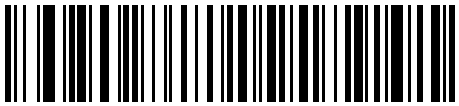
.



***80 msec**



140 msec



200 msec

Polarity

Polarity determines how the digital scanner's wand emulation interface creates the Digitized Bar code Pattern (DBP). DBP is a digital signal that represents the scanned bar code. Different decoders expect the DBP to be in a certain format. The DBP either uses "highs" to represent bars and "lows" to represent spaces (margins), or "highs" to represent spaces (margins) and "lows" to represent bars.

Scan the appropriate bar code to select the polarity required by the decoder.

***Bar High/Margin Low**

Bar Low/Margin High

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the digital scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the host, and an error beep sounds on the digital scanner.

***Send Bar Codes With Unknown Characters (Enable)**

Do Not Send Bar Codes With Unknown Characters (Disable)

Convert All to Code 39

By default, the wand emulation interface sends data to the attached host in the same symbology that was decoded. This can present a problem for older systems that do not recognize some newer symbologies (for example, RSS).

Enabling this parameter ignores the symbology that was decoded, and transmits the data as if it were a Code 39 bar code. Any lowercase characters in the original data stream transmit as uppercase characters. This also allows ADF formatting.

If **Ignore Unknown Characters** is enabled, the digital scanner replaces characters that do not have a corresponding character in the Code 39 symbology with a space.

If **Ignore Unknown Characters** is disabled, if the digital scanner encounters characters that do not have a corresponding Code 39 character, it emits an error beep and does not transmit data.

ADF Note: By default, the wand emulation interface does not allow scanned data to use ADF rules. Enabling this parameter allows the scanned data to use ADF rules. See *Chapter 15, Advanced Data Formatting*.

Convert All to Code 39 for Wand Host (Enable)

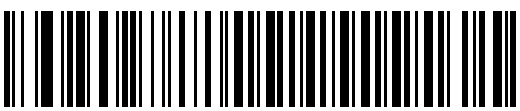
***Do Not Convert All to Code 39 for Wand Host (Disable)**

Convert Code 39 to Full ASCII

By default, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. If this parameter is enabled, the data sent to the wand interface is encoded in Code 39 Full ASCII. This setting requires that the host be able to interpret Code 39 Full ASCII data.

This setting applies only if **Convert All to Code 39** is also enabled for wand hosts.

***Do Not Convert Code 39 to Full ASCII (Disable)**



Convert Code 39 to Full ASCII (Enable)

11

Scanner Emulation Interface

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Connecting Using Scanner Emulation 11-4
Scanner Emulation Default Parameters 11-5
Scanner Emulation Host Parameters 11-6
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- Beep Style 11-6
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- Convert Newer Code Types 11-8
- Module Width 11-8
- Convert All Bar Codes to Code 39 11-9
- Code 39 Full ASCII Conversion 11-9
- Transmission Timeout 11-10
- Ignore Unknown Characters 11-11
- Leading Margin 11-12
- Check for Decode LED 11-13

Introduction

This chapter provides instructions for programming the digital scanner to interface with a scanner emulation host. With scanner emulation, the cradle connects either to an external decoder or to a decoder integrated in a portable terminal or Point-of-Sale (POS) terminal.

Throughout the programming bar code menus, default values are indicated with asterisks (*****).

Connecting Using Scanner Emulation

To perform scanner emulation, connect the digital scanner cradle to a mobile computer, or a controller that collects the data and interprets it for the host.

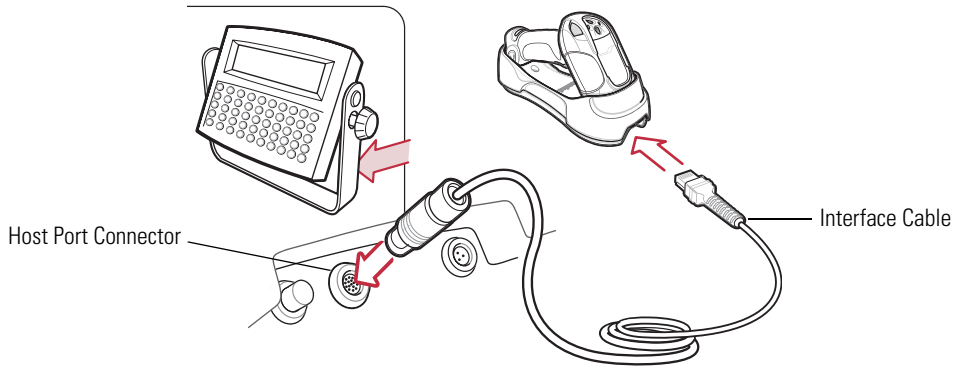

Figure 11-1. Scanner Emulation Connection

Note

Interface cables vary depending on configuration. The connectors may be different from those illustrated in Figure 11-1, but the steps to connect the digital scanner cradle remain the same.

Disconnect the power supply before changing host cables or the digital scanner may not recognize the new host.

1. Attach the modular connector of the scanner emulation interface cable to the cable interface port on the digital scanner cradle. See *Connecting the Cradle on page 1-6*.
2. Connect the other end of the scanner emulation interface cable to the scanner port on the mobile computer or controller.
3. Ensure all connections are secure.
4. Pair the digital scanner to the cradle by scanning the bar code on the cradle.
5. Scan the *Scanner Emulation Host* bar code on page 11-6 to enable the scanner emulation interface.
6. To modify parameter options, scan the appropriate bar codes in this chapter.
7. Connect an external power supply if required.

WARNING

Connect the cradle to a 5 volt decoder only. Connecting to a 12 volt decoder can cause damage and invalidate the warranty.

Scanner Emulation Default Parameters

Table 11-1 lists the defaults for the scanner emulation host. To change an option, scan the appropriate bar code(s) provided in this chapter.

Note

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 11-1. Scanner Emulation Default Table

Parameter	Default	Page Number
Scanner Emulation Host Parameters		
Beep Style	Beep on Successful Transmit	11-6
Parameter Pass-Through	Parameter Process and Pass Through	11-7
Convert Newer Code Types	Convert Newer Code Types	11-8
Module Width	20 µs Module Width	11-8
Convert All Bar Codes to Code 39	Disable	11-9
Code 39 Full ASCII Conversion	Disable	11-9
Transmission Timeout	3 seconds	11-10
Ignore Unknown Characters	Send Bar Codes with Unknown Characters	11-11
Leading Margin	2 ms	11-12
Check for Decode LED	Check for Decode LED	11-13

Scanner Emulation Host Parameters

Scanner Emulation Host

Scan the following bar code to enable the scanner emulation host.

Scanner Emulation Host

Beep Style

The scanner emulation host supports three different beep styles.

- **Beep On Successful Transmit** (default): The digital scanner beeps when the attached decoder issues the decode signal to the digital scanner. This way, the digital scanner and the decoder beep at the same time.
- **Beep at Decode Time:** The digital scanner beeps on its decode. This results in a double beep sequence from most decoders, since the digital scanner beeps, and the decoder beeps (at a different frequency) when it successfully decodes the output.
- **Do Not Beep:** The digital scanner does not beep; the attached decoder issues the decode beep.

In all cases, if an error occurs, the digital scanner issues error beeps.

***Beep On Successful Transmit**

Beep at Decode Time

Do Not Beep

Parameter Pass-Through

The scanner emulation host can process parameter bar code messages and send them to the attached decoder. In this way, customers using Symbol-compliant decoders can control the behavior of the system by scanning the necessary parameters only once.

Note

For example, to enable Discrete 2 of 5, scan the **Enable Discrete 2 of 5** parameter bar code with the digital scanner. The digital scanner and the attached decoder both process the parameter.

***Parameter Process and Pass-Through**

Parameter Process Only

Convert Newer Code Types

The digital scanner supports a variety of code types that attached decoder systems typically cannot decode. To allow compatibility in these environments, the digital scanner converts these code types to more common symbologies, as per the following table. Symbologies not listed on this chart are transmitted normally.

Scan this code type:	**Transmitted as:**
Code 11	Code 39
RSS (14, Limited, and Expanded), Coupon Code, PDF, MicroPDF, MaxiCode, DataMatrix, QR Code, Postal Codes, Composite Codes	Code 128

When decoding these code types with this parameter disabled, the digital scanner issues convert error beeps and transmits no data.

***Convert Newer Code Types**

Reject Newer Code Types

Module Width

The standard module width is 20 µs. For an extremely slow decoder system, use this parameter to extend this module width to 50 µs.

***20 µs Module Width**

50 µs Module Width

Convert All Bar Codes to Code 39

Scan the appropriate bar code to enable or disable converting all bar code data to Code 39.

***Do Not Convert All To Code 39 (Disable)**

Convert All To Code 39 (Enable)

Code 39 Full ASCII Conversion

By default, characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. If this parameter is enabled, the data sent to the scanner emulation host is encoded in Code 39 Full ASCII. This setting requires that the host be able to interpret Code 39 Full ASCII data.

This setting applies only if **Convert All to Code 39** is also enabled.

***Do Not Convert Code 39 To Full ASCII (Disable)**

Convert Code 39 To Full ASCII (Enable)

Transmission Timeout

The scanner emulation host transmits bar code data to the attached decoder and waits for the decoder to assert the decode signal, indicating successful transmission. If, after a specified amount of time, the decode signal is not asserted (indicating that the attached decoder has not successfully received the bar code data), the digital scanner issues transmit error beeps.

Scan the appropriate bar code to select the desired transmission timeout.

***3 Second Transmission Timeout**

4 Second Transmission Timeout

5 Second Transmission Timeout

10 Second Transmission Timeout

30 Second Transmission Timeout

Ignore Unknown Characters

Unknown characters are characters that the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the host, and an error beep sounds.

***Send Bar Codes with Unknown Characters (Enable)**

Do Not Send Bar Codes with Unknown Characters (Disable)

Leading Margin

Scan one of the following bar codes to select a leading margin duration.

1 ms Leading Margin

***2 ms Leading Margin**

3 ms Leading Margin

5 ms Leading Margin

10 ms Leading Margin

Check for Decode LED

The attached decoder typically asserts the decode line to signal to the scanner emulation host that it has successfully decoded the transmitted bar code. Some decoders, however, do not assert the decode signal upon a decode. In this case, the digital scanner emits transmit error beeps to indicate that the bar code was not successfully transmitted. Scan the **Ignore Decode LED** bar code to disable the transmit error beeps.

***Check For Decode LED**

Ignore Decode LED

12

123Scan

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Setting Up 123Scan 12-3

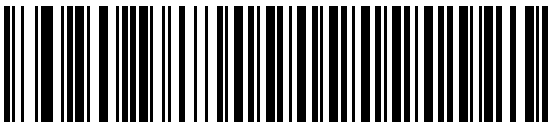
Introduction

123Scan is a Windows®-based utility that programs the digital scanner with all parameters including Advanced Data Formatting (ADF) rules. An ADF rule modifies bar code data before it is sent to the host, ensuring compatibility between bar code data and the host application without having to modify the host software. Digital scanners can be programmed via PC download or by scanning a sheet of bar codes generated by 123Scan. Save digital scanner programming in a file for electronic distribution. 123Scan includes a help file.

Setting Up 123Scan

To communicate with the 123Scan program:

1. Load 123Scan, included in the documentation CD-ROM, onto a host computer running Windows 98, Windows 2000, or Windows XP.
2. Connect the digital scanner to the host computer using an RS-232 cable. See *Connecting an RS-232 Interface on page 7-4*.
3. Scan the following bar code to enable the 123Scan interface on the digital scanner. Refer to the 123Scan instructions for programming the digital scanner.



123Scan Configuration

13 Symbologies

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Redundancy Level 2 13-60
Redundancy Level 3 13-60
Redundancy Level 4 13-60
Security Level 13-62
Security Level 0 13-62
Security Level 1 13-62
Security Level 2 13-62
Security Level 3 13-62
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Abort Macro PDF Entry 13-65

Introduction

This chapter describes symbology features and provides the programming bar codes for selecting these features for the digital scanner. Before programming, follow the instructions in *Chapter 1, Getting Started*.

The digital scanner is shipped with the settings shown in the *Symbology Default Table on page 13-6* (also see *Appendix A, Standard Default Parameters* for all host and miscellaneous digital scanner defaults). If the default values suit requirements, programming is not necessary. Set feature values by scanning single bar codes or short bar code sequences. To return all features to default values, scan the *Set Default Parameter* bar code on page 4-5.

If not using a Synapse or USB cable, select the host type (see the specific host chapter) after the digital scanner emits power-up beeps.

Scanning Sequence Examples

In most cases, scan only one bar code to set a parameter value. For example, to transmit bar code data without the UPC-A check digit, scan the *Do Not Transmit UPC-A Check Digit* bar code under *Transmit UPC-A/UPC-E/UPC-E1 Check Digit on page 13-15*. The digital scanner issues a fast warble beep and the LED turns green, indicating a successful parameter entry.

Other parameters, such as **Set Length(s) for D 2 of 5** require scanning several bar codes in sequence. See the parameter description for this procedure.

Errors While Scanning

Unless otherwise specified, if an error is made during a scanning sequence, re-scan the correct parameter.

Symbology Default Parameters

Table 13-1 lists the defaults for all symbologies parameters. To change any option, scan the appropriate bar code(s) provided in this chapter.

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 13-1. Symbology Default Table

Parameter	Default	Page Number
UPC/EAN		
UPC-A	Enable	13-10
UPC-E	Enable	13-10
UPC-E1	Disable	13-11
EAN-13	Enable	13-11
EAN-8	Enable	13-12
Bookland EAN	Disable	13-12
Decode UPC/EAN Supplementals (2 and 5 digits)	Ignore Supplementals	13-13
UPC/EAN Supplemental Redundancy	10	13-14
Transmit UPC-A Check Digit	Enable	13-15
Transmit UPC-E Check Digit	Enable	13-15
Transmit UPC-E1 Check Digit	Enable	13-15
UPC-A Preamble	System Character	13-16
UPC-E Preamble	System Character	13-17
UPC-E1 Preamble	System Character	13-18
Convert UPC-E to A	Disable	13-19
Convert UPC-E1 to A	Disable	13-19
EAN-8 Extend	Disable	13-20
UCC Coupon Extended Code	Disable	13-20
Code 128		
Code 128	Enable	13-21
UCC/EAN-128	Enable	13-21
ISBT 128	Enable	13-22

Table 13-1. Symbology Default Table (Continued)

Parameter	Default	Page Number
Code 39		
Code 39	Enable	13-23
Trioptic Code 39	Disable	13-23
Convert Code 39 to Code 32	Disable	13-24
Code 32 Prefix	Disable	13-24
Set Length(s) for Code 39	2 to 55	13-25
Code 39 Check Digit Verification	Disable	13-26
Transmit Code 39 Check Digit	Disable	13-27
Code 39 Full ASCII Conversion	Disable	13-27
Buffer Code 39	Disable	13-28
Code 93		
Code 93	Disable	13-30
Set Lengths for Code 93	4 to 55	13-31
Code 11		
Code 11	Disable	13-32
Set Lengths for Code 11	4 to 55	13-33
Code 11 Check Digit Verification	Disable	13-34
Transmit Code 11 Check Digits	Disable	13-34
Interleaved 2 of 5 (I 2 of 5)		
Interleaved 2 of 5 (I 2 of 5)	Enable	13-35
Set Lengths for Interleaved 2 of 5	14	13-35
I 2 of 5 Check Digit Verification	Disable	13-37
Transmit I 2 of 5 Check Digit	Disable	13-37
Convert I 2 of 5 to EAN-13	Disable	13-38
Discrete 2 of 5 (D 2 of 5)		
Discrete 2 of 5	Disable	13-39
Set Lengths for D 2 of 5	12	13-39
Codabar (NW - 7)		
Codabar	Disable	13-41

Table 13-1. Symbology Default Table (Continued)

Parameter	Default	Page Number
Set Lengths for Codabar	5 to 55	13-42
CLSI Editing	Disable	13-43
NOTIS Editing	Disable	13-43
MSI		
MSI	Disable	13-44
Set Lengths for MSI	4 to 55	13-44
MSI Check Digits	One	13-46
Transmit MSI Check Digit(s)	Disable	13-46
MSI Check Digit Algorithm	Mod 10/Mod 10	13-47
Postal Codes		
US Postnet	Enable	13-48
US Planet	Enable	13-48
UK Postal	Enable	13-49
Transmit UK Postal Check Digit	Enable	13-49
Japan Postal	Enable	13-50
Australian Postal	Enable	13-50
Dutch Postal	Enable	13-51
Transmit US Postal Check Digit	Enable	13-51
RSS (Reduced Space Symbology)		
RSS 14	Enable	13-52
RSS Limited	Enable	13-52
RSS Expanded	Enable	13-53
Convert RSS to UPC/EAN	Disable	13-53
Composite		
Composite CC-C	Disable	13-54
Composite CC-A/B	Disable	13-54
Composite TLC-39	Disable	13-55
UPC Composite Mode	Always Linked	13-55
UCC/EAN-128 Emulation Mode for UCC/EAN Composite Codes	Disable	13-56

Table 13-1. Symbology Default Table (Continued)

Parameter	Default	Page Number
2D Symbologies		
PDF417	Enable	13-57
MicroPDF417	Disable	13-57
Code 128 Emulation	Disable	13-58
Data Matrix	Enable	13-58
Maxicode	Enable	13-59
QR Code	Enable	13-59
Symbology - Specific Security Levels		
Redundancy Level	1	13-60
Security Levels	0	13-62
Intercharacter Gap Size	Normal	13-64
Macro PDF		
Flush Macro PDF Buffer		13-65
Abort Macro PDF Entry		13-65

UPC/EAN

Enable/Disable UPC-A

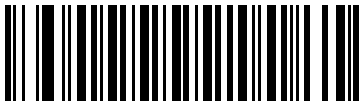
To enable or disable UPC-A, scan the appropriate bar code below.

***Enable UPC-A**

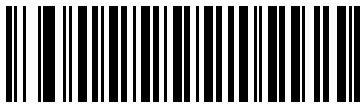
Disable UPC-A

Enable/Disable UPC-E

To enable or disable UPC-E, scan the appropriate bar code below.



***Enable UPC-E**



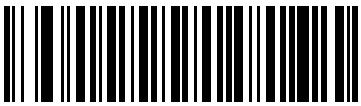
Disable UPC-E

Enable/Disable UPC-E1

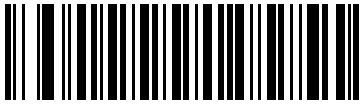
To enable or disable UPC-E1, scan the appropriate bar code below.

Note

UPC-E1 is not a UCC (Uniform Code Council) approved symbology.



Enable UPC-E1



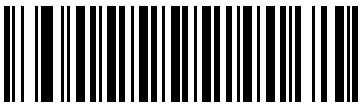
***Disable UPC-E1**

Enable/Disable EAN-13

To enable or disable EAN-13, scan the appropriate bar code below.

Note

JAN is a subset of EAN, therefore parameters controlling EAN also affect JAN.

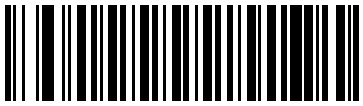


***Enable EAN-13**

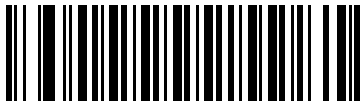
Disable EAN-13

Enable/Disable EAN-8

To enable or disable EAN-8, scan the appropriate bar code below.



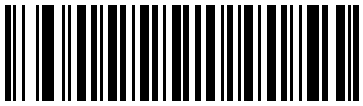
***Enable EAN-8**



Disable EAN-8

Enable/Disable Bookland EAN

To enable or disable Bookland EAN, scan the appropriate bar code below.



Enable Bookland EAN

***Disable Bookland EAN**

Decode UPC/EAN Supplementals

Supplementals are bar codes appended according to specific format conventions (e.g., UPC A+2, UPC E+2, EAN 13+2). Six options are available.

- If **Decode UPC/EAN Only With Supplementals** is selected, UPC/EAN symbols without supplementals are not decoded.
- If **Ignore Supplementals** is selected, and the digital scanner encounters a UPC/EAN with a supplemental, it decodes the UPC/EAN and ignores the supplemental bar code.
- If selecting **Autodiscriminate UPC/EAN Supplementals**, choose an appropriate supplemental redundancy value. See *UPC/EAN Supplemental Redundancy on page 13-14*. A value of 14 or more is recommended.
- Select **Enable 378/379 Supplemental Mode** to delay only EAN-13 bar codes starting with a '378' or '379' prefix by the supplemental search process. All other UPC/EAN bar codes are exempt from the search and are reported instantly upon decode.
- Select **Enable 978 Supplemental Mode** to delay only EAN-13 bar codes starting with a '978' prefix by the supplemental search process. All other UPC/EAN bar codes are exempt from the search and are reported instantly upon decode.
- Select **Enable Smart Supplemental Mode** to delay only EAN-13 bar codes starting with a '378,' '379,' or '978' prefix by the supplemental search process. All other UPC/EAN bar codes are exempt from the search and are reported instantly upon decode.

Note

To minimize the risk of invalid data transmission, select either to decode or ignore supplemental characters.

Decode UPC/EAN Only With Supplementals

***Ignore Supplementals**

Decode UPC/EAN Supplementals (continued)

Autodiscriminate UPC/EAN Supplementals

Enable 378/379 Supplemental Mode

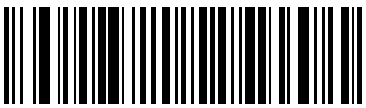
Enable 978 Supplemental Mode

Enable Smart Supplemental Mode

UPC/EAN Supplemental Redundancy

With **Autodiscriminate UPC/EAN Supplementals** selected, this option adjusts the number of times a symbol without supplementals is decoded before transmission. The range is from two to 30 times. 14 or above is recommended when decoding a mix of UPC/EAN symbols with and without supplementals. The default is 10.

To set a decode redundancy value, scan the following bar code. Next, scan two numeric bar codes from *Appendix D, Numeric Bar Codes*. Use a leading zero for single digit numbers. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.



UPC/EAN Supplemental Redundancy

Transmit UPC-A/UPC-E/UPC-E1 Check Digit

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code to transmit the bar code data with or without the UPC-A, UPC-E, or UPC-E1 check digit.

UPC-A Check Digit

***Transmit UPC-A Check Digit**

Do Not Transmit UPC-A Check Digit

UPC-E Check Digit

***Transmit UPC-E Check Digit**

Do Not Transmit UPC-E Check Digit

UPC-E1 Check Digit

***Transmit UPC-E1 Check Digit**

Do Not Transmit UPC-E1 Check Digit

UPC-A Preamble

Preamble characters are part of the UPC symbol consisting of Country Code and System Character. There are three options for transmitting a UPC-A preamble to the host device:

- Transmit System Character only.
- Transmit System Character and Country Code ("0" for USA).
- Transmit no preamble.

Select the appropriate option to match the host system.

No Preamble
(<DATA>)

***System Character**
(<SYSTEM CHARACTER> <DATA>)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

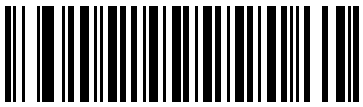
UPC-E Preamble

Preamble characters are part of the UPC symbol consisting of Country Code and System Character. There are three options for transmitting a UPC-E preamble to the host device:

- Transmit System Character only.
- Transmit System Character and Country Code ("0" for USA).
- Transmit no preamble.

Select the appropriate option to match the host system.

No Preamble
(<DATA>)



***System Character**
(<SYSTEM CHARACTER> <DATA>)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

UPC-E1 Preamble

Preamble characters are part of the UPC symbol consisting of Country Code and System Character. There are three options for transmitting a UPC-E1 preamble to the host device:

- Transmit System Character only.
- Transmit System Character and Country Code ("0" for USA).
- Transmit no preamble.

Select the appropriate option to match the host system.

No Preamble
(<DATA>)

***System Character**
(<SYSTEM CHARACTER> <DATA>)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

Convert UPC-E to UPC-A

When enabled, UPC-E (zero suppressed) decoded data is converted to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

When disabled, UPC-E decoded data is transmitted as UPC-E data, without conversion.

Convert UPC-E to UPC-A (Enable)

***Do Not Convert UPC-E to UPC-A (Disable)**

Convert UPC-E1 to UPC-A

When enabled, UPC-E1 decoded data is converted to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

When disabled, UPC-E1 decoded data is transmitted as UPC-E1 data, without conversion.

Convert UPC-E1 to UPC-A (Enable)

***Do Not Convert UPC-E1 to UPC-A (Disable)**

EAN-8 Extend

When enabled, this parameter adds five leading zeros to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

When disabled, EAN-8 symbols are transmitted as is.

Enable EAN-8 Zero Extend

***Disable EAN-8 Zero Extend**

UCC Coupon Extended Code

When enabled, this parameter decodes UPC-A bar codes starting with digit '5', EAN-13 bar codes starting with digit '99', and UPC-A/EAN-128 coupon codes. UPC-A, EAN-13, and EAN-128 must be enabled to scan all types of coupon codes.

Enable UCC Coupon Extended Code

***Disable UCC Coupon Extended Code**

Note

Use *UPC/EAN Supplemental Redundancy on page 13-14* to control autodiscrimination of the EAN-128 (right half) of a coupon code.

Code 128

Enable/Disable Code 128

To enable or disable Code 128, scan the appropriate bar code below.

***Enable Code 128**

Disable Code 128

Enable/Disable UCC/EAN-128

To enable or disable UCC/EAN-128, scan the appropriate bar code below.

***Enable UCC/EAN-128**

Disable UCC/EAN-128

Enable/Disable ISBT 128

To enable or disable ISBT 128, scan the appropriate bar code below.

***Enable ISBT 128**

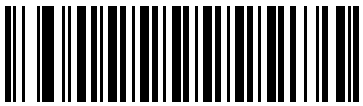
Disable ISBT 128

Code 39

Enable/Disable Code 39

To enable or disable Code 39, scan the appropriate bar code below.

***Enable Code 39**

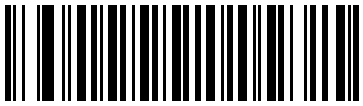


Disable Code 39

Enable/Disable Trioptic Code 39

Trioptic Code 39 is a variant of Code 39 used for marking computer tape cartridges. Trioptic Code 39 symbols always contain six characters. To enable or disable Trioptic Code 39, scan the appropriate bar code below.

Enable Trioptic Code 39



***Disable Trioptic Code 39**

Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

Convert Code 39 to Code 32

Code 32 is a variant of Code 39 used by the Italian pharmaceutical industry. Scan the appropriate bar code below to enable or disable converting Code 39 to Code 32.

Note **Code 39** must be enabled for this parameter to function.

Convert Code 39 to Code 32 (Enable)

***Do Not Convert Code 39 to Code 32 (Disable)**

Code 32 Prefix

Scan the appropriate bar code to enable or disable adding the prefix character "A" to all Code 32 bar codes.

Note **Convert Code 39 to Code 32** must be enabled for this parameter to function.

Enable Code 32 Prefix

***Disable Code 32 Prefix**

Set Lengths for Code 39

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 39 for any length, one or two discrete lengths, or lengths within a specific range. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options.

When setting lengths for different bar code types by scanning single digit numbers, the single digit number must always be preceded by a leading zero.

One Discrete Length - This option allows the digital scanner to decode only those Code 39 symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only Code 39 symbols with 14 characters, scan **Code 39 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those Code 39 symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode a Code 39 symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode Code 39 symbols containing any number of characters within the digital scanner's capability.

Set Lengths for Code 39 (continued)

Code 39 - One Discrete Length

Code 39 - Two Discrete Lengths

Code 39 - Length Within Range

Code 39 - Any Length

Code 39 Check Digit Verification

When this feature is enabled, the digital scanner checks the integrity of all Code 39 symbols to verify that the data complies with a specified check digit algorithm. The digital scanner decodes only those Code 39 symbols that include a modulo 43 check digit. Enable this feature only if the Code 39 symbols contain a modulo 43 check digit.

Enable Code 39 Check Digit

***Disable Code 39 Check Digit**

Transmit Code 39 Check Digit

Scan a bar code below to transmit Code 39 data with or without the check digit.

Transmit Code 39 Check Digit (Enable)

***Do Not Transmit Code 39 Check Digit (Disable)**

Note

Code 39 Check Digit Verification must be enabled for this parameter to function.

Code 39 Full ASCII Conversion

Code 39 Full ASCII is a variant of Code 39 that pairs characters to encode the full ASCII character set. To enable or disable Code 39 Full ASCII, scan the appropriate bar code below.

Mapping Code 39 characters to ASCII values is host dependent. For keyboard wedge host conversion, see *Table 6-2 on page 6-16*. For RS-232 host conversion, see *Table 7-4 on page 7-22*. For USB host conversion, see *Table 8-2 on page 8-13*.

Enable Code 39 Full ASCII

***Disable Code 39 Full ASCII**

Note

Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

Code 39 Buffering (Scan & Store)

This feature allows the digital scanner to accumulate data from multiple Code 39 symbols.

Select **Buffer Code 39** to temporarily buffer all Code 39 symbols having a leading space as a first character for later transmission. The leading space is not buffered. Since this feature affects Code 39 only, for best performance configure the digital scanner to decode the Code 39 symbology only.

Decoding a valid Code 39 symbol with no leading space causes transmission in sequence of all buffered data in a first-in first-out format, plus transmission of the "triggering" symbol. See the following pages for further details.

Select **Do Not Buffer Code 39** to transmit all decoded Code 39 symbols immediately without storing in the buffer.

Buffer Code 39 (Enable)

***Do Not Buffer Code 39 (Disable)**

While there is data in the transmission buffer, selecting **Do Not Buffer Code 39** is not allowed. The buffer holds 200 bytes of information.

To disable Code 39 buffering when there is data in the transmission buffer, first force the buffer transmission (see *Transmitting Buffer on page 13-29*) or clear the buffer.

Buffering Data

To buffer data, enable Code 39 buffering and read a Code 39 symbol with a space immediately following the start pattern.

- Unless the data overflows the transmission buffer, the digital scanner issues a low-high beep to indicate successful decode and buffering. For overflow conditions, see *Overfilling Transmission Buffer*.
- The digital scanner adds the decoded data excluding the leading space to the transmission buffer.
- No transmission occurs.

Clearing Transmission Buffer

To clear the transmission buffer, scan the **Clear Buffer** bar code below, which contains only a start character, a dash (minus), and a stop character. The digital scanner issues a short high-low-high beep and erases the transmission buffer.

Clear Buffer

Note

Because the **Clear Buffer** bar code contains only the dash (minus) character, set the Code 39 length to include length 1 before scanning this bar code.

Transmitting Buffer

There are two methods to transmit the Code 39 buffer:

- Scan the **Transmit Buffer** bar code, which includes only a start character, a plus (+), and a stop character. The digital scanner transmits and clears the buffer, and issues a low-high beep.

Transmit Buffer

- Scan a Code 39 bar code with a leading character other than a space. The digital scanner appends the new decode data to the buffered data, transmits and clears the buffer, and issues a low-high beep to signal that the buffer was transmitted.

Note

Because the **Transmit Buffer** bar code contains only a plus (+) character, set the Code 39 length to include length 1 before scanning this bar code.

Overfilling Transmission Buffer

The Code 39 buffer holds 200 characters. If the symbol just read overflows the transmission buffer, the digital scanner issues three long high beeps to indicate it rejected the symbol, and no transmission occurs. The data in the buffer is not affected.

Attempt to Transmit an Empty Buffer

If the symbol just read was the **Transmit Buffer** symbol and the Code 39 buffer is empty, the digital scanner issues a short low-high-low beep to signal that the buffer is empty, and no transmission occurs. The buffer remains empty.

Code 93

Enable/Disable Code 93

To enable or disable Code 93, scan the appropriate bar code below.

Enable Code 93

***Disable Code 93**

Set Lengths for Code 93

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 93 for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - This option allows the digital scanner to decode only those Code 93 symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only Code 93 symbols with 14 characters, scan **Code 93 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those Code 93 symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those Code 93 symbols containing either 2 or 14 characters, select **Code 93 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode a Code 93 symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode Code 93 symbols containing any number of characters within the digital scanner's capability.

Code 93 - One Discrete Length

Code 93 - Two Discrete Lengths

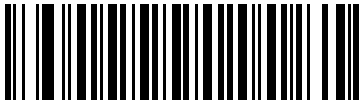
Code 93 - Length Within Range

Code 93 - Any Length

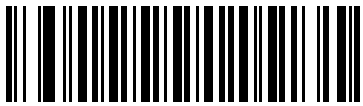
Code 11

Code 11

To enable or disable Code 11, scan the appropriate bar code below.



Enable Code 11



***Disable Code 11**

Set Lengths for Code 11

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 11 for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - This option allows the digital scanner to decode only those Code 11 symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only Code 11 symbols with 14 characters, scan **Code 11 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those Code 11 symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those Code 11 symbols containing either 2 or 14 characters, select **Code 11 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode a Code 11 symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan **Code 11 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode Code 11 symbols containing any number of characters within the digital scanner's capability.

Code 11 - One Discrete Length

Code 11 - Two Discrete Lengths

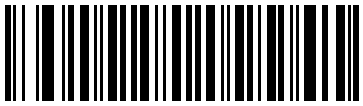
Code 11 - Length Within Range

Code 11 - Any Length

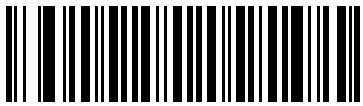
Code 11 Check Digit Verification

This feature allows the digital scanner to check the integrity of all Code 11 symbols to verify that the data complies with the specified check digit algorithm. This selects the check digit mechanism for the decoded Code 11 bar code. The options are to check for one check digit, check for two check digits, or disable the feature.

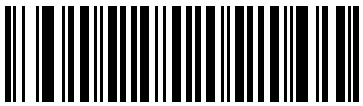
To enable this feature, scan the bar code below corresponding to the number of check digits encoded in the Code 11 symbols.



***Disable**



One Check Digit

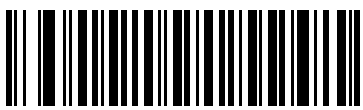


Two Check Digits

Transmit Code 11 Check Digits

This feature selects whether or not to transmit the Code 11 check digit(s).

Transmit Code 11 Check Digit(s)
(Enable)



***Do Not Transmit Code 11 Check Digit(s)**
(Disable)

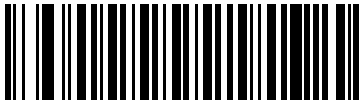
Note

Code 11 Check Digit Verification must be enabled for this parameter to function.

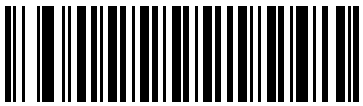
Interleaved 2 of 5 (I 2 of 5)

Enable/Disable Interleaved 2 of 5

To enable or disable Interleaved 2 of 5, scan the appropriate bar code below, and select an Interleaved 2 of 5 length.



***Enable Interleaved 2 of 5**



Disable Interleaved 2 of 5

Set Lengths for Interleaved 2 of 5

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for I 2 of 5 for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - This option allows the digital scanner to decode only those I 2 of 5 symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only I 2 of 5 symbols with 14 characters, scan **I 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those I 2 of 5 symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those I 2 of 5 symbols containing either 2 or 14 characters, select **I 2 of 5 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode an I 2 of 5 symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode I 2 of 5 symbols containing between 4 and 12 characters, first scan **I 2 of 5 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode I 2 of 5 symbols containing any number of characters within the digital scanner's capability.

Due to the construction of the I 2 of 5 symbology, the digital scanner can interpret a scan line covering only a portion of the code as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**I 2 of 5 - One Discrete Length - Two Discrete Lengths**) for I 2 of 5 applications.

Set Lengths for Interleaved 2 of 5 (continued)

I 2 of 5 - One Discrete Length

I 2 of 5 - Two Discrete Lengths

I 2 of 5 - Length Within Range

I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

When this feature is enabled, the digital scanner checks the integrity of all I 2 of 5 symbols to verify that the data complies with either the specified Uniform Symbology Specification (USS), or the Optical Product Code Council (OPCC) check digit algorithm.

***Disable**

USS Check Digit

OPCC Check Digit

Transmit I 2 of 5 Check Digit

Scan the appropriate bar code below to transmit I 2 of 5 data with or without the check digit.

Transmit I 2 of 5 Check Digit (Enable)

***Do Not Transmit I 2 of 5 Check Digit (Disable)**

Convert I 2 of 5 to EAN-13

This parameter converts a 14 character I 2 of 5 code into EAN-13, and transmits to the host as EAN-13. Before enabling this, first enable the I 2 of 5 symbology. The code must include a leading zero and a valid EAN-13 check digit.

To enable this feature, scan **Convert I 2 of 5 to EAN-13 (Enable)**.

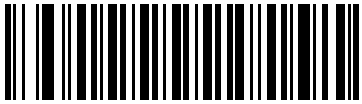
Convert I 2 of 5 to EAN-13 (Enable)

***Do Not Convert I 2 of 5 to EAN-13 (Disable)**

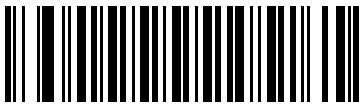
Discrete 2 of 5 (D 2 of 5)

Enable/Disable Discrete 2 of 5

To enable or disable Discrete 2 of 5, scan the appropriate bar code below.



Enable Discrete 2 of 5



***Disable Discrete 2 of 5**

Set Lengths for Discrete 2 of 5

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for D 2 of 5 for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - This option allows the digital scanner to decode only those D 2 of 5 symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only D 2 of 5 symbols with 14 characters, scan **D 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those D 2 of 5 symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those D 2 of 5 symbols containing either 2 or 14 characters, select **D 2 of 5 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode a D 2 of 5 symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode D 2 of 5 symbols containing any number of characters within the digital scanner's capability.

Note

Due to the construction of the D 2 of 5 symbology, the digital scanner can interpret a scan line covering only a portion of the code as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**D 2 of 5 - One Discrete Length - Two Discrete Lengths**) for D 2 of 5 applications.

Set Lengths for Discrete 2 of 5 (continued)

D 2 of 5 - One Discrete Length

D 2 of 5 - Two Discrete Lengths

D 2 of 5 - Length Within Range

D 2 of 5 - Any Length

Codabar (NW - 7)

Enable/Disable Codabar

To enable or disable Codabar, scan the appropriate bar code below.

Enable Codabar

***Disable Codabar**

Set Lengths for Codabar

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Codabar for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - This option allows the digital scanner to decode only those Codabar symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only Codabar symbols with 14 characters, scan **Codabar - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those Codabar symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those Codabar symbols containing either 2 or 14 characters, select **Codabar - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode a Codabar symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode Codabar symbols containing any number of characters within the digital scanner's capability.

Codabar - One Discrete Length

Codabar - Two Discrete Lengths

Codabar - Length Within Range

Codabar - Any Length

CLSI Editing

When enabled, this parameter strips the start and stop characters and inserts a space after the first, fifth, and tenth characters of a 14-character Codabar symbol. Enable this feature if the host system requires this data format.

Note

Symbol length does not include start and stop characters.

Enable CLSI Editing

***Disable CLSI Editing**

NOTIS Editing

When enabled, this parameter strips the start and stop characters from a decoded Codabar symbol. Enable this feature if the host system requires this data format.

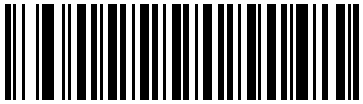
Enable NOTIS Editing

***Disable NOTIS Editing**

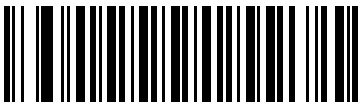
MSI

Enable/Disable MSI

To enable or disable MSI, scan the appropriate bar code below.



Enable MSI



***Disable MSI**

Set Lengths for MSI

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for MSI for any length, one or two discrete lengths, or lengths within a specific range.

One Discrete Length - This option allows the digital scanner to decode only those MSI symbols containing a selected length. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length. For example, to decode only MSI symbols with 14 characters, scan **MSI - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Two Discrete Lengths - This option allows the digital scanner to decode only those MSI symbols containing either of two selected lengths. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select lengths. For example, to decode only those MSI symbols containing either 2 or 14 characters, select **MSI - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Length Within Range - This option allows the digital scanner to decode an MSI symbol within a specific length range. Use the numeric bar codes in *Appendix D, Numeric Bar Codes* to select the length range. For example, to decode MSI symbols containing between 4 and 12 characters, first scan **MSI - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (insert a leading zero for single digit numbers). In case of an error, or to change the selection, scan **Cancel** on *page D-5*.

Any Length - This option allows the digital scanner to decode MSI symbols containing any number of characters within the digital scanner's capability.

Due to the construction of the MSI symbology, the digital scanner can interpret a scan line covering only a portion of the code as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**MSI - One Discrete Length - Two Discrete Lengths**) for MSI applications.

Set Lengths for MSI (continued)

MSI - One Discrete Length

MSI - Two Discrete Lengths

MSI - Length Within Range

MSI - Any Length

MSI Check Digits

With MSI symbols, one check digit is mandatory and always verified by the reader. The second check digit is optional. If the MSI codes include two check digits, enable the verification of the second check digit by scanning the bar code below.

See *MSI Check Digit Algorithm on page 13-47* for the selection of second digit algorithms.

***One MSI Check Digit**

Two MSI Check Digits

Transmit MSI Check Digit(s)

Scan a bar code below to transmit MSI data with or without the check digit.

Transmit MSI Check Digit(s)
(Enable)

***Do Not Transmit MSI Check Digit(s)**
(Disable)

MSI Check Digit Algorithm

Two algorithms are possible for the verification of the second MSI check digit. Select the bar code below corresponding to the algorithm used to encode the check digit.

MOD 10/MOD 11

***MOD 10/MOD 10**

Postal Codes

US Postnet

To enable or disable US Postnet, scan the appropriate bar code below.

***Enable US Postnet**

Disable US Postnet

US Planet

To enable or disable US Planet, scan the appropriate bar code below.

***Enable US Planet**

Disable US Planet

UK Postal

To enable or disable UK Postal, scan the appropriate bar code below.

***Enable UK Postal**

Disable UK Postal

Transmit UK Postal Check Digit

Select whether to transmit UK Postal data with or without the check digit.

***Transmit UK Postal Check Digit**

Do Not Transmit UK Postal Check Digit

Japan Postal

To enable or disable Japan Postal, scan the appropriate bar code below.

***Enable Japan Postal**

Disable Japan Postal

Australian Postal

To enable or disable Australian Postal, scan the appropriate bar code below.

***Enable Australian Postal**

Disable Australian Postal

Dutch Postal

To enable or disable Dutch Postal, scan the appropriate bar code below.

***Enable Dutch Postal**

Disable Dutch Postal

Transmit US Postal Check Digit

Select whether to transmit US Postal data with or without the check digit.

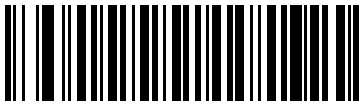
***Transmit US Postal Check Digit**

Do Not Transmit US Postal Check Digit

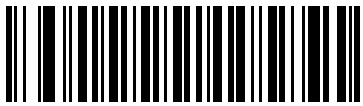
RSS (Reduced Space Symbology)

The variants of RSS are RSS 14, RSS Expanded, and RSS Limited. The limited and expanded versions have stacked variants. Scan the appropriate bar code below to enable or disable each variant of RSS.

RSS 14



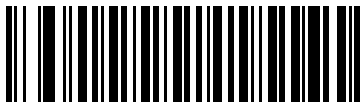
***Enable RSS 14**



Disable RSS 14

RSS Limited

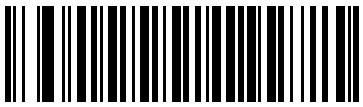
***Enable RSS Limited**



Disable RSS Limited

RSS Expanded

***Enable RSS Expanded**



Disable RSS Expanded

Convert RSS to UPC/EAN

This parameter only applies to RSS-14 and RSS Limited symbols not decoded as part of a composite symbol. When this conversion is enabled, RSS-14 and RSS Limited symbols encoding a single zero as the first digit have the leading '010' stripped and the bar code reported as EAN-13.

When the digital scanner decodes bar codes beginning with two or more zeros but not six zeros, it strips the leading '0100' and reports the bar code as UPC-A. The UPC-A Preamble parameter to transmit the system character and country code applies to converted bar codes. Note that the digital scanner cannot strip the system character or the check digit.

Enable Convert RSS to UPC/EAN

***Disable Convert RSS to UPC/EAN**

Composite

Composite CC-C

Scan a bar code below to enable or disable Composite bar codes of type CC-C.

Enable CC-C

***Disable CC-C**

Composite CC-A/B

Scan a bar code below to enable or disable Composite bar codes of type CC-A/B.

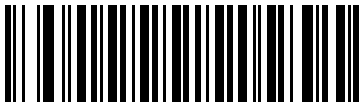
Enable CC-A/B

***Disable CC-A/B**

Composite TLC-39

Scan a bar code below to enable or disable Composite bar codes of type TLC-39.

Enable TLC39



***Disable TLC39**

UPC Composite Mode

UPC symbols can be "linked" with a 2D symbol during transmission as if they were one symbol. There are three options for these symbols:

- Select **UPC Never Linked** to transmit UPC bar codes regardless of whether a 2D symbol is detected.
- Select **UPC Always Linked** to transmit UPC bar codes and the 2D portion.
  If 2D is not present, the UPC bar code does not transmit.
- If **Autodiscriminate UPC Composites** is selected, the scanner determines if there is a 2D portion, then transmits the UPC as well as the 2D portion if present.

UPC Never Linked

***UPC Always Linked**

Autodiscriminate UPC Composites

UCC/EAN-128 Emulation Mode for UCC/EAN Composite Codes

Scan one of the following bar codes to enable or disable this mode. Enable this to transmit composite bar codes as UCC/EAN-128 bar codes as per the AIM specification for UCC/EAN Composite Codes.

Enable UCC/EAN-128 Emulation Mode for UCC/EAN Composite Codes

***Disable UCC/EAN-128 Emulation Mode for UCC/EAN Composite Codes**

2D Symbologies

Enable/Disable PDF417

To enable or disable PDF417, scan the appropriate bar code below.

***Enable PDF417**

Disable PDF417

Enable/Disable MicroPDF417

To enable or disable MicroPDF417, scan the appropriate bar code below.

Enable MicroPDF417

***Disable MicroPDF417**

Code 128 Emulation

When this parameter is enabled, the scanner transmits data from certain MicroPDF417 symbols as if it was encoded in Code 128 symbols. Transmit AIM Symbology Identifiers must be enabled for this parameter to work.

If Code 128 Emulation is enabled, these MicroPDF417 symbols are transmitted with one of the following prefixes:

]C1 if the first codeword is 903-907, 912, 914, 915

]C2 if the first codeword is 908 or 909

]C0 if the first codeword is 910 or 911

If disabled, they are transmitted with one of the following prefixes:

]L3 if the first codeword is 903-907, 912, 914, 915

]L4 if the first codeword is 908 or 909

]L5 if the first codeword is 910 or 911

Scan a bar code below to enable or disable Code 128 Emulation.

Enable Code 128 Emulation

***Disable Code 128 Emulation**

Data Matrix

To enable or disable Data Matrix, scan the appropriate bar code below.

***Enable Data Matrix**

Disable Data Matrix

Maxicode

To enable or disable Maxicode, scan the appropriate bar code below.

***Enable Maxicode**

Disable Maxicode

QR Code

To enable or disable QR Code, scan the appropriate bar code below.

***Enable QR Code**

Disable QR Code

Redundancy Level

The digital scanner offers four levels of decode redundancy. Select higher redundancy levels for lower quality bar codes. As redundancy levels increase, the digital scanner's aggressiveness decreases.

Select the redundancy level appropriate for the bar code quality.

Redundancy Level 1

The digital scanner must successfully read the following code types twice before decode:

Code Type	Code Length
Codabar	8 characters or less
MSI	4 characters or less
D 2 of 5	8 characters or less
I 2 of 5	8 characters or less

Redundancy Level 2

The digital scanner must successfully read all code types twice before decode.

Redundancy Level 3

The digital scanner must successfully read code types other than the following twice before decode. It must read the following codes three times:

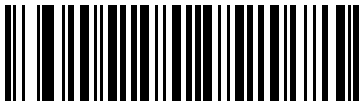
Code Type	Code Length
MSI Plessey	4 characters or less
D 2 of 5	8 characters or less
I 2 of 5	8 characters or less
Codabar	8 characters or less

Redundancy Level 4

The digital scanner must successfully read all code types three times before decode.

Redundancy Level (continued)

***Redundancy Level 1**



Redundancy Level 2

Redundancy Level 3

Redundancy Level 4

Security Level

The digital scanner offers four levels of decode security for UPC/EAN bar codes. Select higher security levels for lower quality bar codes. There is an inverse relationship between security and decode speed, so be sure to choose only that level of security necessary for the application.

Security Level 0

This default setting allows the digital scanner to operate fastest, while providing sufficient security in decoding "in-spec" UPC/EAN bar codes.

Security Level 1

As bar code quality levels diminish, certain characters become prone to misdecodes before others (i.e., 1, 2, 7, 8). If the digital scanner is misdecoding poorly printed bar codes, and the misdecodes are limited to these characters, select this security level.

Security Level 2

If the digital scanner is misdecoding poorly printed bar codes, and the misdecodes are not limited to characters 1, 2, 7, and 8, select this security level.

Security Level 3

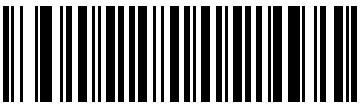
If the digital scanner is still misdecoding, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec bar codes. Selecting this level of security can significantly impair the decoding ability of the digital scanner. If this level of security is necessary, try to improve the quality of the bar codes.

Security Level (continued)

***Security Level 0**

Security Level 1

Security Level 2



Security Level 3

Intercharacter Gap Size

The Code 39 and Codabar symbologies have an intercharacter gap that is typically quite small. Due to various bar code-printing technologies, this gap can grow larger than the maximum size allowed, preventing the digital scanner from decoding the symbol. If this problem occurs, scan the **Large Intercharacter Gaps** parameter to tolerate these out-of-specification bar codes.

***Normal Intercharacter Gaps**

Large Intercharacter Gaps

Macro PDF Features

Macro PDF is a special feature for concatenating multiple PDF symbols into one file. The digital scanner can decode symbols that are encoded with this feature, and can store more than 64 kb of decoded data stored in up to 50 MacroPDF symbols.

When printing, keep each Macro PDF sequence separate, as each sequence has unique identifiers. Do not mix bar codes from several Macro PDF sequences, even if they encode the same data. When scanning Macro PDF sequences, scan the entire sequence without interruption. If, when scanning a mixed sequence, the digital scanner emits two long low beeps (low-low) this indicates an inconsistent file ID or inconsistent symbology error.

Flush Macro Buffer

This flushes the buffer of all decoded Macro PDF data stored to that point, transmits it to the host device, and aborts from Macro PDF mode.

Flush Macro PDF Buffer

Abort Macro PDF Entry

This clears all currently-stored Macro PDF data in the buffer without transmission and aborts from Macro PDF mode.

Abort Macro PDF Entry

14 Miscellaneous Scanner Options

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Introduction

This chapter includes bar codes to customize how data is transmitted to the host device. Also see each host chapter for the appropriate host connections and host device features for the digital scanner. See *Chapter 13, Symbologies* and *Chapter 15, Advanced Data Formatting* for customizing data for transmission to the host device.

Before programming, follow the instructions in *Chapter 1, Getting Started*.

The digital scanner is shipped with the settings shown in Table 14-1 (also see *Appendix A, Standard Default Parameters* for all host and miscellaneous scanner defaults). If the default values suit requirements, programming is not necessary. Set feature values by scanning single bar codes or short bar code sequences.

Scanning Sequence Examples

In most cases, scan only one bar code to set a parameter value. Other parameters, such as **Prefix Value**, require scanning several bar codes in sequence. See the parameter description for this procedure.

Errors While Scanning

Unless otherwise specified, if an error is made during a scanning sequence, re-scan the correct parameter.

Miscellaneous Default Parameters

Table 14-1 lists the defaults for miscellaneous scanner options parameters. To change an option, scan the appropriate bar code(s) in this chapter.

See *Appendix A, Standard Default Parameters* for all user preference, host, symbology, and miscellaneous default parameters.

Table 14-1. Miscellaneous Scanner Options Default Table

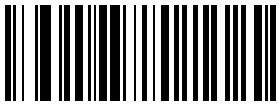
Parameter	Default	Page Number
Miscellaneous Scanner Options		
Transmit Code ID Character	None	14-4
Prefix Value	7013 <CR><LF>	14-5
Suffix 1 Value Suffix 2 Value	7013 <CR><LF>	14-5
Scan Data Transmission Format	Data As Is	14-6
FN1 Substitution Values	Set FN1 Substitution Value	14-7
Transmit “No Read” Message	Disable No Read	14-8
Report Version		14-8

Miscellaneous Scanner Parameters

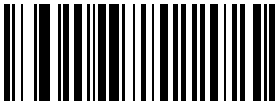
Transmit Code ID Character

A code ID character identifies the code type of a scanned bar code. This is useful when the digital scanner is decoding more than one code type. Select a code ID character to insert between the prefix and the decoded symbol.

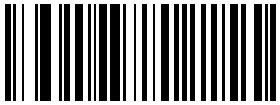
Select no code ID character, a Symbol code ID character, or an AIM code ID character. For code ID characters, see *Symbol Code Identifiers on page B-3* and *AIM Code Identifiers on page B-4*.



Symbol Code ID Character



AIM Code ID Character



***None**

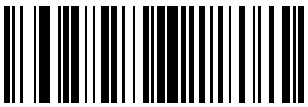
Prefix/Suffix Values

To assign a prefix and/or one or two suffix values to append to scan data for use in data editing, scan the appropriate bar code, then scan a four-digit number (i.e., four numeric bar codes) from *Appendix D, Numeric Bar Codes* that corresponds to key codes for various terminals. For conversion information, see the ASCII Character Set tables in the appropriate host chapter. To correct an error or change the selection, scan **Cancel** on *page D-5*.

Note

To use Prefix/Suffix values, set the *Scan Data Transmission Format*.

Scan Prefix



Scan Suffix 1

Scan Suffix 2

Data Format Cancel

Scan Data Transmission Format

To change the scan data format, scan one of the following bar codes corresponding to the desired format.

Note

If using this parameter **do not** use ADF rules to set the prefix/suffix.

To set values for the prefix and/or suffix, see *Prefix/Suffix Values on page 14-5*.

***Data As Is**

<DATA> <SUFFIX 1>

<DATA> <SUFFIX 2>

<DATA> <SUFFIX 1> <SUFFIX 2>

<PREFIX> <DATA >

Scan Data Transmission Format (continued)

<PREFIX> <DATA> <SUFFIX 1>

<PREFIX> <DATA> <SUFFIX 2>

<PREFIX> <DATA> <SUFFIX 1> <SUFFIX 2>

FN1 Substitution Values

The keyboard wedge and USB HID keyboard hosts support a FN1 Substitution feature. Enable this to replace any FN1 character (0x1b) in an EAN128 bar code with a defined value. This value defaults to 7013 (Enter Key).

1. To select a FN1 substitution value, scan the following bar code.

Set FN1 Substitution Value

2. Enter the 4-digit FN1 substitution (ASCII) value by scanning each digit in *Appendix D, Numeric Bar Codes*. See the ASCII Character Set table for the host interface.

To correct an error or change the selection, scan *Cancel on page D-5*.

To enable FN1 Substitution for keyboard wedge, scan the **Enable Keyboard Wedge** FN1 Substitution bar code on *page 6-13*.

To enable FN1 Substitution for the USB HID keyboard, scan the **Enable USB Keyboard** FN1 Substitution bar code on *page 8-11*.

Transmit "No Read" Message

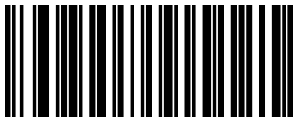
Scan one of the following bar codes to select whether or not to transmit a "No Read" message. When enabled, the characters NR transmit when a bar code is not decoded. When disabled, if a symbol does not decode, nothing transmits to the host.

Enable No Read

***Disable No Read**

Report Version

Scan the bar code below to report the version of software currently installed in the digital scanner.



Report Software Version

15 Advanced Data Formatting

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Introduction

Advanced Data Formatting (ADF) is a means of customizing data before transmission to the host device to suit particular requirements.

To implement ADF, scan a related series of bar codes which begin on page 15-8, or use the 123Scan utility (see *Chapter 12, 123Scan*) which allows programming the digital scanner with ADF rules.

Avoid using ADF formatting with bar codes containing more than 60 characters. To add a prefix or suffix value for such bar codes, use *Prefix/Suffix Values* and *Scan Data Transmission Format on page 14-6*. Using ADF with longer bar codes transmits the bar code in segments of length 252 or less (depending on the host selected), and applies the rule to each segment

If using the wand interface with the digital scanner, in order to use ADF rules to format data, first enable *Convert All to Code 39 on page 10-9*.

Rules: Criteria Linked to Actions

ADF uses rules to customize data. These rules perform detailed actions when the data meets certain criteria. One rule may consist of single or multiple criteria applied to single or multiple actions.

For instance, a data formatting rule could be:

Criteria: *When scan data is Code 39, length 12, and data at the start position is the string "129",*

Actions: *pad all sends with zeros to length 8,*
send all data up to X,
send a space.

If the digital scanner scans a Code 39 bar code of 1299X1559828, it transmits the following: 00001299<space>.

If the digital scanner scans a Code 39 bar code of 1299X15598, it ignores this rule because the bar code didn't meet the length criteria.

The rule specifies the editing conditions and requirements before data transmission occurs.

Creating ADF Rules

When programming a rule, make sure the rule is logically correct. Plan ahead before scanning.

To program each data formatting rule:

- **Start the Rule**. Scan the **Begin New Rule** bar code on page 15-8.
- **Criteria**. Scan the bar codes for all pertinent criteria. Criteria can include code type (e.g., Code 128), code length, or data that contains a specific character string (e.g., the digits "129"). See *Criteria on page 15-11* for options.
- **Actions**. Scan all actions related to, or affecting, these criteria. The actions of a rule specify how to format the data for transmission. See *ADF Programming Example on page 15-4*.
- **Save the Rule**. Scan the **Save Rule** bar code on page 15-8. This places the rule in the "top" position in the rule buffer.

To erase criteria, actions, and entire rules, scan the appropriate bar code on page 15-9.

Beeper Definitions on page 2-4 guide through the programming steps.

ADF Programming Example

This section provides an example of how to enter ADF rules to use for scan data.

An auto parts distribution center wants to encode manufacturer ID, part number, and destination code into their own Code 128 bar codes. The distribution center also has products that carry UPC bar codes, placed there by the manufacturer. The Code 128 bar codes have the following format:

MMMMMPPPPPDD

Where: M = Manufacturer ID
P = Part Number
D = Destination Code

The distribution center uses a host computer with dedicated control characters for manufacturer ID <CTRL M>, part number <CTRL P>, and destination code <CTRL D>. At this center the UPC data is treated as a manufacturer ID code.

The center programs the following rules:

- When scanning data of code type Code 128, send the next 5 characters, send the manufacturer ID key <CTRL M>, send the next 5 characters, send the part number key <CTRL P>, send the next 2 characters, send the destination code key <CTRL D>.
- When scanning data of code type UPC/EAN, send all data, send the manufacturer ID key <CTRL M>.

To enter these rules, see the following sections.

Rule 1: The Code 128 Scanning Rule

Step	Scan Bar Code	On Page	Beep Indication
1	Begin New Rule	15-8	High High
2	Code 128	15-11	High High
3	Send next 5 characters	15-27	High High
4	Send <CTRL M>	15-47	High High
5	Send next 5 characters	15-27	High High
6	Send <CTRL P>	15-47	High High
7	Send next 2 characters	15-26	High High
8	Send <CTRL D>	15-46	High High
9	Save Rule	15-8	High Low High Low

Rule 2: The UPC Scanning Rule

Step	Scan Bar Code	On Page	Beep Indication
1	Begin New Rule	15-8	High High
2	UPC/EAN	15-12	High High
3	Send all remaining data	15-26	High High
4	Send <CTRL M>	15-47	High High
5	Save Rule	15-8	High Low High Low

To correct any errors made while entering this rule, scan the **Quit Entering Rules** bar code on page 15-9, or after saving the rule, scan the **Erase Previously Saved Rule** bar code on page 15-9.

Alternate Rule Sets

If desired, group ADF rules into one of four alternate sets to turn on and off when needed. This is useful to format the same message in different ways. For example, a Code 128 bar code contains the following information:

Class (2 digits), Stock Number (8) digits, Price (5 digits)

This bar code might look like this:

245671243701500

where:

Class = 24

Stock Number = 56712437

Price = 01500

Ordinarily, data is sent as follows:

24 (class key)

56712437 (stock key)

01500 (enter key)

But, when there is a sale, send only the following:

24 (class key)

56712437 (stock key)

and the cashier enters the price manually.

To implement this, first enter an ADF rule that applies to the normal situation, such as:

> Scan Rule Belongs to Set 1. When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, send the data that remains, send the Enter key.

The "sale" rule may look like this:

> Scan Rule Belongs to Set 2. When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key.

To switch between the two sets of rules, program a "switching rule" to specify what type of bar code to scan to switch between rule sets. For example, in the case of the "sale" rule above, the rule programmer wants the cashier to scan the bar code "M" before a sale. To do this, enter the rule as follows:

> When scanning a bar code of length 1 that begins with "M", select rule set number 1.

Program another rule to switch back:

> When scanning a bar code of length 1 that begins with "N", turn off rule set number 1.

To switch back to normal rules in the "sale" rule:

> When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, turn off rule set 1.

For optimal results, scan the **Disable All Rule Sets** bar code on page 15-10 after programming a rule belonging to an alternate rule set.

In addition to enabling and disabling rule sets within the rules, enable or disable them by scanning the appropriate bar codes on 15-10.

Rules Hierarchy (in Bar Codes)

When programming rules, be sure to program the most general rule first, as rules are stored at the "top" of a rules list in a buffer as they are entered. For example, after creating three rules, the list is configured as follows:

> Third Rule
>
> Second Rule
>
> First Rule

After scanning data, the rules hierarchy checks the rules list from top to bottom to determine if the criteria matches (and therefore, whether to apply the actions). Actions modify the data format specified by the first matching set of criteria it finds, then disregard subsequent rules. For this reason, be sure to program the most general rule first.

For example, if the THIRD rule states:

> When scanning a bar code of any length, send all data, then send the ENTER key.

and the SECOND rule states:

> When scanning a Code 128 bar code of length 12, send the first four characters, then send the ENTER key, then send all remaining data.

and the digital scanner scanned a Code 128 bar code of length 12, the THIRD rule would apply and the SECOND rule would not function.

Note standard data editing functions (scan options) are considered ADF rules, and the previous hierarchy applies to them. Scan options include prefix/suffix programming in the parameter *Scan Data Transmission Format*. These rules reside in the same "rule list" as ADF rules, so the order of their creation is also important.

Default Rules

Every scanner has a default rule to send all scan data. Scanners with custom software may have one or more default rules burned in. The rules hierarchy checks user programmable rules first, then the default rules. To disable default rules enter the following general rule in the user programmable buffer:

When receiving scan data, send all data.

Since this rule always applies, ADF never applies the default rules.

Special Considerations for Multipoint Networks

ADF rules scanned by an individual scanner are NOT broadcast to other scanners in the piconet, as are other parameters; however, ADF rules that 123Scan generates ARE broadcast to all scanners in the piconet. 123Scan rules transmitted from the base are stored at the BEGINNING of the ADF rule buffer, regardless of the presence of existing rules, while rules scanned by the scanner are appended to the existing buffer. For this reason, transmit rules to be shared by all scanners from 123Scan FIRST. Then, scan rules to customize an individual scanner.

Special Commands

Pause Duration

This parameter along with the **Send Pause** parameter on page 15-30 inserts a pause in the data transmission. To set pauses scan a two-digit number (i.e., two bar codes) representing a 0.1 second interval. For example, scanning bar codes "0" and "1" inserts a 0.1 second pause; "0" and "5" inserts a 0.5 second delay. See *Appendix D, Numeric Bar Codes*. To correct an error or change a selection, scan *Cancel on page D-5*.

Pause Duration

Begin New Rule

Scan this bar code to start entering a new rule.

Begin New Rule

Save Rule

Scan this bar code to save the rule.

Save Rule

Erase

Use these bar codes to erase criteria, actions, or rules.

Erase Criteria And Start Again

Erase Actions And Start Again

Erase Previously Saved Rule

Erase All Rules

Quit Entering Rules

Scan this bar code to quit entering rules.

Quit Entering Rules

Disable Rule Set

Use these bar codes to disable rule sets.

Disable Rule Set 1

Disable Rule Set 2

Disable Rule Set 3

Disable Rule Set 4

Disable All Rule Sets

Criteria

Code Types

Select any number of code types to be affected by the rule. Scan all selected code types in succession, prior to selecting other criteria. *To select all code types, do not scan any code type.*

Code 39

Codabar

RSS 14

RSS Limited

RSS Expanded

Code 128

D 2 OF 5

Code Types (continued)

IATA 2 OF 5

I 2 OF 5

Code 93

UPC-A

UPC-E

EAN-8

EAN-13

Code Types (continued)

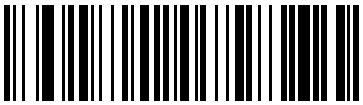
MSI

UCC/EAN 128

UPC-E1

Bookland EAN

Trioptic Code 39

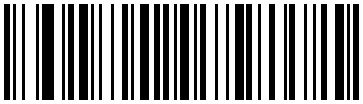


Code 11

Code 32

Code Types (continued)

ISBT 128



EAN 128

Coupon Code

US Postnet

US Planet

UK Postal

Japan Postal

Code Types (continued)

Australian Postal

Dutch Postal

PDF417

MicroPDF

Macro PDF

Macro MicroPDF

MaxiCode

Code Types (continued)

Datamatrix

QR Code

TLC 39

UPC/EAN Composites

RSS and EAN128 Composites

Note

When selecting composite bar codes, enable AIM IDs if parsing UPC or EAN composite data, or data from an application that uses symbol separators.

Code Lengths

Scan these bar codes to define the number of characters the selected code types must contain. Select one length per rule only. *Do not select any code length to select code types of any length.*

1 Character

2 Characters

3 Characters

4 Characters

5 Characters

6 Characters

Code Lengths (continued)

7 Characters

8 Characters

9 Characters

10 Characters

11 Characters

12 Characters

13 Characters

Code Lengths (continued)

14 Characters

15 Characters

16 Characters

17 Characters

18 Characters

19 Characters

20 Characters

Code Lengths (continued)

21 Characters

22 Characters

23 Characters

24 Characters

25 Characters

26 Characters

27 Characters

Code Lengths (continued)

28 Characters

29 Characters

30 Characters

Message Containing a Specific Data String

Use this feature to select whether the formatting affects data that begins with a specific character or data string, or contains a specific character or data string.

There are four features:

- Specific String at Start
- Specific String, Any Location
- Any Message OK
- Rule Belongs to Set.

Specific String at Start

To set a specific string at start:

1. Scan the **Specific String At Start** bar code.
2. Scan bar codes representing the desired character string (up to 8 characters) using the *Alphanumeric Keyboard on page 15-89*.
3. Scan *End of Message on page 15-98*.

Specific String At Start

Specific String, Any Location

To set a specific string, any location:

1. Scan the **Specific String Any Location** bar code.
2. Scan a two-digit number representing the *position* (use a leading "zero" if necessary) using the *Numeric Keypad on page 15-23*.
3. Scan bar codes representing the desired character string (up to 8 characters) using the *Alphanumeric Keyboard on page 15-89*.
4. Scan *End of Message on page 15-98*.

Specific String Any Location

Any Message OK

Do not scan any bar code to format all selected code types, regardless of information contained.

Numeric Keypad

Do not confuse bar codes on this page with those on the alphanumeric keyboard.

0

1

2

3

4

5

6

Numeric Keypad (continued)

7

8

9

Cancel

Rule Belongs To Set

Scan a bar code to select the set to which a rule belongs. There are four possible rule sets. See *Alternate Rule Sets on page 15-5* for more information about rule sets.

Rule Belongs To Set 1

Rule Belongs To Set 2

Rule Belongs To Set 3

Rule Belongs To Set 4

Actions

Select how to format the data for transmission.

Send Data

Use the following bar codes to send all data that remains, send all data up to a specific character selected from the *Alphanumeric Keyboard on page 15-89*, or send the next N characters. N = any number from 1 to 254, selected from the *Alphanumeric Keyboard*.

Send Data Up To Character

Send All Data That Remains

Send Next Character

Send Next 2 Characters

Send Next 3 Characters

Send Next 4 Characters

Send Data (continued)

Send Next 5 Characters

Send Next 6 Characters

Send Next 7 Characters

Send Next 8 Characters

Send Next 9 Characters

Send Next 10 Characters

Send Next 11 Characters

Send Data (continued)

Send Next 12 Characters

Send Next 13 Characters

Send Next 14 Characters

Send Next 15 Characters

Send Next 16 Characters

Send Next 17 Characters

Send Next 18 Characters

Send Data (continued)

Send Next 19 Characters

Send Next 20 Characters

Setup Field(s)

Move Cursor

Select one of the following Move Cursor options:

- Scan the **Move Cursor To a Character** bar code, then enter a character by scanning a bar code from the *Alphanumeric Keyboard* beginning on page 15-89, to move the cursor to the position after the matching character. If the character is not there, the rule fails and ADF tries the next rule.
- Scan the **Move Cursor to Start** bar code to move the cursor to the beginning of the data.
- Scan the **Move Cursor Past Character** bar code, then enter a character by scanning a bar code from the *Alphanumeric Keyboard* beginning on page 15-89, to move the cursor past all sequential occurrences of this character. For example, if the selected character is 'A', then the cursor moves past 'A', 'AA', 'AAA', etc. If the character is not there, the cursor does not move (i.e., this has no effect).

Move Cursor To Character

Move Cursor To Start

Move Cursor Past Character

Send Pause

Scan the bar code below to insert a pause in the transmission of data. To set the length of this pause, see *Pause Duration on page 15-8*.

Send Pause

Skip Ahead

Use the following bar codes to move the cursor ahead characters.

Skip Ahead 1 Character

Skip Ahead 2 Characters

Skip Ahead 3 Characters

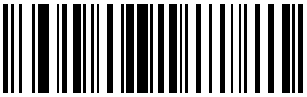
Skip Ahead 4 Characters

Skip Ahead 5 Characters

Skip Ahead 6 Characters

Skip Ahead 7 Characters

Skip Ahead (continued)



Skip Ahead 8 Characters

Skip Ahead 9 Characters

Skip Ahead 10 Characters

Skip Back

Use the following bar codes to move the cursor back characters.

Skip Back 1 Character

Skip Back 2 Characters

Skip Back 3 Characters

Skip Back (continued)

Skip Back 4 Characters

Skip Back 5 Characters

Skip Back 6 Characters

Skip Back 7 Characters

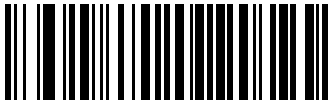
Skip Back 8 Characters

Skip Back 9 Characters

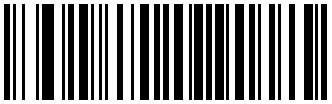
Skip Back 10 Characters

Send Preset Value

Use these bar codes to send preset values. To set these values, see *Prefix/Suffix Values on page 14-5*. For conversion information, see the ASCII Character Set tables in the appropriate host chapter.



Send Prefix (Value 2)



Send Suffix (Value 1)

Modify Data

These options modify data as described and apply to all send commands that follow it within a rule. For example, programming *pad zeros to length 6, send next 3 characters, stop padding, send next 5 characters,* adds three zeros to the first send, and the next send is unaffected by the padding. These options do not apply to the **Send Keystroke** or **Send Preset Value** options.

Remove All Spaces

To remove all spaces in the send commands that follow, scan this bar code.

Remove All Spaces

Crunch All Spaces

To leave one space between words, scan this bar code. This also removes all leading and trailing spaces.

Crunch All Spaces

Stop Space Removal

Scan this bar code to disable space removal.

Stop Space Removal

Remove Leading Zeros

Scan this bar code to remove all leading zeros.

Remove Leading Zeros

Stop Zero Removal

Scan this bar code to disable the removal of zeros.

Stop Zero Removal

Pad Data with Spaces

To pad data to the left, scan the bar code containing the desired number of spaces. Send commands activate this parameter.

Pad Spaces To Length 1

Pad Spaces To Length 2

Pad Spaces To Length 3

Pad Spaces To Length 4

Pad Spaces To Length 5

Pad Spaces To Length 6

Pad Spaces To Length 7

Pad Data with Spaces (continued)

Pad Spaces To Length 8

Pad Spaces To Length 9

Pad Spaces To Length 10

Pad Spaces To Length 11

Pad Spaces To Length 12

Pad Spaces To Length 13

Pad Spaces To Length 14

Pad Data with Spaces (continued)

Pad Spaces To Length 15

Pad Spaces To Length 16

Pad Spaces To Length 17

Pad Spaces To Length 18

Pad Spaces To Length 19

Pad Spaces To Length 20

Pad Spaces To Length 21

Pad Data with Spaces (continued)

Pad Spaces To Length 22

Pad Spaces To Length 23

Pad Spaces To Length 24

Pad Spaces To Length 25

Pad Spaces To Length 26

Pad Spaces To Length 27

Pad Spaces To Length 28

Pad Data with Spaces (continued)

Pad Spaces To Length 29

Pad Spaces To Length 30

Stop Pad Spaces

Pad Data with Zeros

To pad data to the left, scan the bar code containing the desired number of zeros. Send commands activate this parameter.

Pad Zeros To Length 1

Pad Zeros To Length 2

Pad Zeros To Length 3

Pad Data with Zeros (continued)

Pad Zeros To Length 4

Pad Zeros To Length 5

Pad Zeros To Length 6

Pad Zeros To Length 7

Pad Zeros To Length 8

Pad Zeros To Length 9

Pad Zeros To Length 10

Pad Data with Zeros (continued)

Pad Zeros To Length 11

Pad Zeros To Length 12

Pad Zeros To Length 13

Pad Zeros To Length 14

Pad Zeros To Length 15

Pad Zeros To Length 16

Pad Zeros To Length 17

Pad Data with Zeros (continued)

Pad Zeros To Length 18

Pad Zeros To Length 19

Pad Zeros To Length 20

Pad Zeros To Length 21

Pad Zeros To Length 22

Pad Zeros To Length 23

Pad Zeros To Length 24

Pad Data with Zeros (continued)

Pad Zeros To Length 25

Pad Zeros To Length 26

Pad Zeros To Length 27

Pad Zeros To Length 28

Pad Zeros To Length 29

Pad Zeros To Length 30

Stop Pad Zeros

Beeps

Select a beep sequence for each ADF rule.

Beep Once

Beep Twice

Beep Three Times

Send Keystroke (Control Characters and Keyboard Characters)

Control Characters

Scan a **Send** bar code to specify the keystroke to send.

Send Control 2

Send Control A

Send Control B

Control Characters (continued)

Send Control C

Send Control D

Send Control E

Send Control F

Send Control G

Send Control H

Send Control I

Control Characters (continued)

Send Control J

Send Control K

Send Control L

Send Control M

Send Control N

Send Control O

Send Control P

Control Characters (continued)

Send Control Q

Send Control R

Send Control S

Send Control T

Send Control U

Send Control V

Send Control W

Control Characters (continued)

Send Control X

Send Control Y

Send Control Z

Send Control [

**Send Control **

Send Control]

Control Characters (continued)

Send Control 6

Send Control -

Keyboard Characters

Scan a **Send** bar code to specify the keyboard characters to send.

Send Space

Send !

Send "

Send #

Keyboard Characters (continued)

Send $

Send %

Send &

Send ‘

Send (

Send)

Send *

Keyboard Characters (continued)

Send +

Send ,

Send -

Send .

Send /

Send 0

Send 1

Keyboard Characters (continued)

Send 2

Send 3

Send 4

Send 5

Send 6

Send 7

Send 8

Keyboard Characters (continued)

Send 9

Send :

Send ;

Send <

Send =

Send >

Send ?

Keyboard Characters (continued)

Send @

Send A

Send B

Send C

Send D

Send E

Send F

Keyboard Characters (continued)

Send G

Send H

Send I

Send J

Send K

Send L

Send M

Keyboard Characters (continued)

Send N

Send O

Send P

Send Q

Send R

Send S

Send T

Keyboard Characters (continued)

Send U

Send V

Send W

Send X

Send Y

Send Z

Send [

Keyboard Characters (continued)

**Send **

Send]

Send ^

Send _

Send `

Send a

Send b

Keyboard Characters (continued)

Send c

Send d

Send e

Send f

Send g

Send h

Send i

Keyboard Characters (continued)

Send j

Send k

Send l

Send m

Send n

Send o

Send p

Keyboard Characters (continued)

Send q

Send r

Send s

Send t

Send u

Send v

Send w

Keyboard Characters (continued)

Send x

Send y

Send z

Send {

Send |

Send }

Send ~

Send ALT Characters

Send Alt 2

Send Alt A

Send Alt B

Send Alt C

Send Alt D

Send Alt E

Send Alt F

Send ALT Characters (continued)

Send Alt G

Send Alt H

Send Alt I

Send Alt J

Send Alt K

Send Alt L

Send Alt M

Send ALT Characters (continued)

Send Alt N

Send Alt O

Send Alt P

Send Alt Q

Send Alt R

Send Alt S

Send Alt T

Send ALT Characters (continued)

Send Alt U

Send Alt V

Send Alt W

Send Alt X

Send Alt Y

Send Alt Z

Send Alt [

Send ALT Characters (continued)

**Send Alt **

Send Alt]

Send Alt 6

Send Alt -

Send Keypad Characters

Send Keypad *

Send Keypad +

Send Keypad -

Send Keypad .

Send Keypad /

Send Keypad 0

Send Keypad 1

Send Keypad Characters (continued)

Send Keypad 2

Send Keypad 3

Send Keypad 4

Send Keypad 5

Send Keypad 6

Send Keypad 7

Send Keypad 8

Send Keypad Characters (continued)

Send Keypad 9

Send Keypad Enter

Send Keypad Numlock

Send Break Key

Send Delete Key

Send Page Up Key

Send End Key

Send Keypad Characters (continued)

Send Page Down Key

Send Pause Key

Send Scroll Lock Key

Send Backspace Key

Send Tab Key

Send Print Screen Key

Send Insert Key

Send Keypad Characters (continued)

Send Home Key

Send Enter Key

Send Escape Key

Send Up Arrow Key

Send Down Arrow Key

Send Left Arrow Key

Send Right Arrow Key

Send Function Key

Send F1 Key

Send F2 Key

Send F3 Key

Send F4 Key

Send F5 Key

Send F6 Key

Send F7 Key

Send Function Key (continued)

Send F8 Key

Send F9 Key

Send F10 Key

Send F11 Key

Send F12 Key

Send F13 Key

Send F14 Key

Send Function Key (continued)

Send F15 Key

Send F16 Key

Send F17 Key

Send F18 Key

Send F19 Key

Send F20 Key

Send F21 Key

Send Function Key (continued)

Send F22 Key

Send F23 Key

Send F24 Key

Send PF1 Key

Send PF2 Key

Send PF3 Key

Send PF4 Key

Send Function Key (continued)

Send PF5 Key

Send PF6 Key

Send PF7 Key

Send PF8 Key

Send PF9 Key

Send PF10 Key

Send PF11 Key

Send Function Key (continued)

Send PF12 Key

Send PF13 Key

Send PF14 Key

Send PF15 Key

Send PF16 Key

Send PF17 Key

Send PF18 Key

Send Function Key (continued)

Send PF19 Key

Send PF20 Key

Send PF21 Key

Send PF22 Key

Send PF23 Key

Send PF24 Key

Send PF25 Key

Send Function Key (continued)

Send PF26 Key

Send PF27 Key

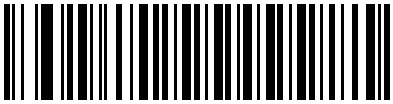
Send PF28 Key

Send PF29 Key

Send PF30 Key

Send Right Control Key

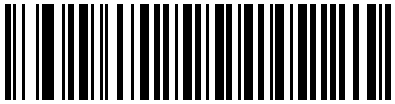
Scan the **Send Right Control Key** bar code to send a tap (press and release) of the Right Control Key.



Send Right Control Key

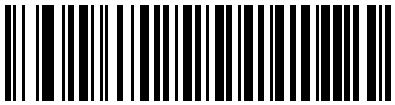
Send Graphic User Interface (GUI) Characters

These actions tap the specified key while holding the system-dependent GUI key. The definition of the GUI key depends on the attached system.

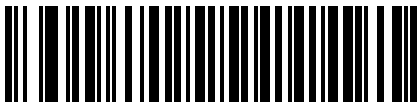


Send GUI 0

Send GUI 1



Send GUI 2

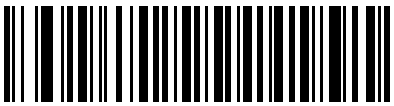


Send GUI 3

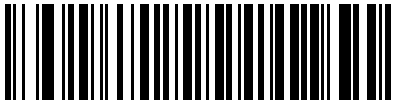
Send GUI 4

Send GUI 5

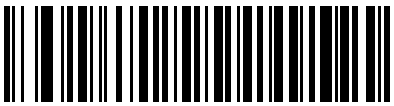
Send Graphic User Interface (GUI) Characters (continued)



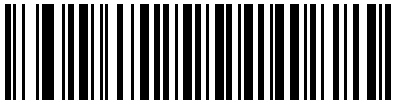
Send GUI 6



Send GUI 7

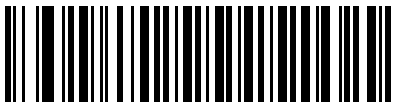


Send GUI 8



Send GUI 9

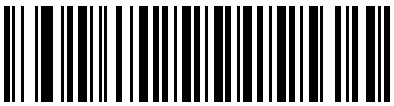
Send GUI A



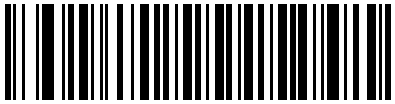
Send GUI B

Send GUI C

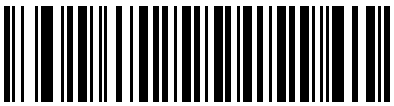
Send Graphic User Interface (GUI) Characters (continued)



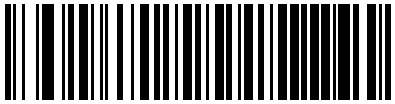
Send GUI D



Send GUI E

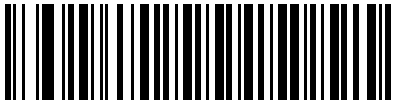


Send GUI F



Send GUI G

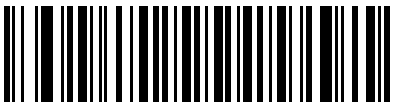
Send GUI H



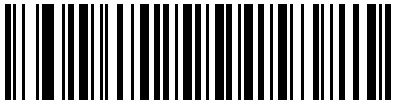
Send GUI I

Send GUI J

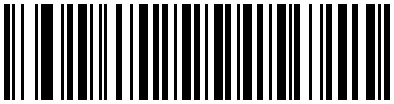
Send Graphic User Interface (GUI) Characters (continued)



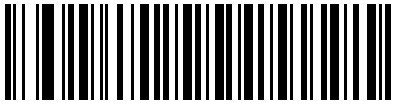
Send GUI K



Send GUI L

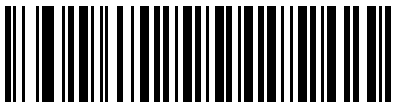


Send GUI M



Send GUI N

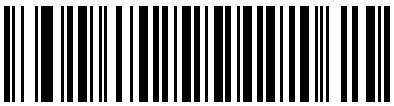
Send GUI O



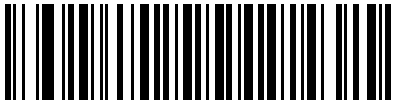
Send GUI P

Send GUI Q

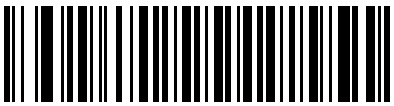
Send Graphic User Interface (GUI) Characters (continued)



Send GUI R



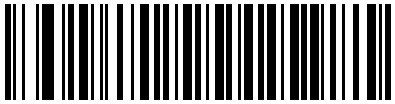
Send GUI S



Send GUI T

Send GUI U

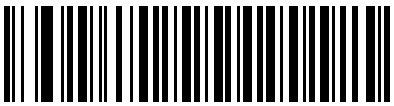
Send GUI V



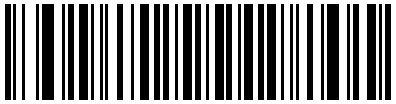
Send GUI W

Send GUI X

Send Graphic User Interface (GUI) Characters (continued)



Send GUI Y



Send GUI Z

Turn On Rule Sets

Use these bar codes to turn rule sets on.

Turn On Rule Set 1

Turn On Rule Set 2

Turn On Rule Set 3

Turn On Rule Set 4

Turn Off Rule Sets

Use these bar codes to turn rule sets off.

Turn Off Rule Set 1

Turn Off Rule Set 2

Turn Off Rule Set 3

Turn Off Rule Set 4

Alphanumeric Keyboard

Space

#

$

%

*****

+

-
(Dash)

Alphanumeric Keyboard (continued)

.

/

!

“

&

‘

(

Alphanumeric Keyboard (continued)

)

:

;

<

=

>

?

Alphanumeric Keyboard (continued)

@

[

\

]

^

_

(Underscore)

`

Alphanumeric Keyboard (continued)

Note

Do not confuse the following numeric bar codes with those on the numeric keypad.

0

1

2

3

4

5

Alphanumeric Keyboard (continued)

6

7

8

9

A

B

C

Alphanumeric Keyboard (continued)

D

E

F

G

H

I

J

Alphanumeric Keyboard (continued)

K

L

M

N

O

P

Q

Alphanumeric Keyboard (continued)

R

S

T

U

V

W

X

Alphanumeric Keyboard (continued)

Y

Z

Cancel

End of Message

a

b

c

Alphanumeric Keyboard (continued)

d

e

f

g

h

i

j

Alphanumeric Keyboard (continued)

k

l

m

n

o

p

q

Alphanumeric Keyboard (continued)

r

s

t

u

v

w

x

Alphanumeric Keyboard (continued)

y

z

{

|

}

~

A

Standard Default Parameters

Table A-1. Standard Default Parameters Table

Parameter	Default	Page Number
User Preferences		
Set Default Parameter	All Defaults	4-5
Parameter Scanning	Enable	4-5
Beeper Tone	Medium	4-6
Beeper Volume	High	4-6
Power Mode	Reduced	4-7
Beep After Good Decode	Enable	4-7
Decode Session Timeout	3.0 seconds	4-8
Fuzzy 1D Decoding	Enable	4-8
Radio Communications		
Connection Maintenance Interval	15 minutes	4-9
Radio Output Power (Bluetooth)	Class 1	4-11
Parameter Broadcast	Enable	4-11
Single Point/Multipoint Operation	Single Point	4-12
Decoding Options		
Focus Mode	Far Focus	5-5
Decoding Illumination	Enable	5-6
Decode Aiming Pattern	Enable	5-6
Keyboard Wedge Host Parameters		
Keyboard Wedge Host Type	IBM PC/AT& IBM PC Compatibles[1]	6-6
Keyboard Wedge Country Types (Country Codes)	North American	6-7
Ignore Unknown Characters	Enable	6-9
Keystroke Delay	0 msec (No Delay)	6-9
Intra-Keystroke Delay	Disable	6-10
Alternate Numeric Keypad Emulation	Disable	6-10
Caps Lock On	Disable	6-11

[1]User selection is required to configure this interface and this is the most common selection.

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
Caps Lock Override	Disable	6-11
Convert Wedge Data	Do Not Convert Wedge Data	6-12
Function Key Mapping	Disable	6-12
FN1 Substitution	Disable	6-13
Send Make and Break	Send Make and Break Scan Codes	6-13
RS-232 Host Parameters		
RS-232 Host Types	Standard RS-232[1]	7-8
Baud Rate	9600	7-9
Parity	None	7-11
Check Receive Errors	Enable	7-12
Stop Bit Select	1 Stop Bit	7-12
Data Bits	8-Bit	7-13
Hardware Handshaking	None	7-13
Software Handshaking	None	7-15
Host Serial Response Time-out	Minimum: 2 Sec	7-17
RTS Line State	Host: Low RTS	7-18
Beep on <BEL>	Disable	7-18
Intercharacter Delay	Minimum: 0 msec	7-19
Nixdorf Mode A/B and OPOS/JPOS Beep/LED Options	Normal Operation	7-20
Ignore Unknown Characters	Send Bar Code	7-21
USB Host Parameters		
USB Device Type	HID Keyboard Emulation	8-6
USB Country Keyboard Types (Country Codes)	North American	8-7
USB Keystroke Delay	No Delay (0 msec)	8-9
USB CAPS Lock Override	Disable	8-9
USB Ignore Unknown Characters	Enable	8-10
Emulate Keypad	Disable	8-10

[1] User selection is required to configure this interface and this is the most common selection.

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
USB Keyboard FN1 Substitution	Disable	8-11
Function Key Mapping	Disable	8-11
Simulated Caps Lock	Disable	8-12
Convert Case	No Case Conversion	8-12
IBM 468X/469X Host Parameters		
Port Address	None Selected	9-6
Convert Unknown to Code 39	Disable	9-6
Wand Emulation Host Parameters		
Wand Emulation Host Types	Symbol OmniLink Interface Controller[1]	10-6
Leading Margin	80 msec	10-7
Polarity	Bar High/Margin Low	10-8
Ignore Unknown Characters	Enable	10-8
Convert All to Code 39	Disable	10-9
Convert Code 39 to Full ASCII	Disable	10-9
Scanner Emulation Host Parameters		
Beep Style	Beep on Successful Transmit	11-6
Parameter Pass-Through	Parameter Process and Pass Through	11-7
Convert Newer Code Types	Convert Newer Code Types	11-8
Module Width	20 µs Module Width	11-8
Convert All Bar Codes to Code 39	Disable	11-9
Code 39 Full ASCII Conversion	Disable	11-9
Transmission Timeout	3 seconds	11-10
Ignore Unknown Characters	Send Bar Codes with Unknown Characters	11-11
Leading Margin	2 ms	11-12
Check for Decode LED	Check for Decode LED	11-13

[1]User selection is required to configure this interface and this is the most common selection.

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
123Scan Configuration Tool		
123Scan Configuration	None[1]	12-3
UPC/EAN		
UPC-A	Enable	13-10
UPC-E	Enable	13-10
UPC-E1	Disable	13-11
EAN-13	Enable	13-11
EAN-8	Enable	13-12
Bookland EAN	Disable	13-12
Decode UPC/EAN Supplementals (2 and 5 digits)	Ignore Supplementals	13-13
UPC/EAN Supplemental Redundancy	10	13-14
Transmit UPC-A Check Digit	Enable	13-15
Transmit UPC-E Check Digit	Enable	13-15
Transmit UPC-E1 Check Digit	Enable	13-16
UPC-A Preamble	System Character	13-16
UPC-E Preamble	System Character	13-17
UPC-E1 Preamble	System Character	13-18
Convert UPC-E to A	Disable	13-19
Convert UPC-E1 to A	Disable	13-19
EAN-8 Extend	Disable	13-20
UCC Coupon Extended Code	Disable	13-20
Code 128		
Code 128	Enable	13-21
UCC/EAN-128	Enable	13-21
ISBT 128	Enable	13-22
Code 39		
Code 39	Enable	13-23
Trioptic Code 39	Disable	13-23

[1] User selection is required to configure this interface and this is the most common selection.

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
Convert Code 39 to Code 32	Disable	13-24
Code 32 Prefix	Disable	13-24
Set Length(s) for Code 39	2 to 55	13-25
Code 39 Check Digit Verification	Disable	13-26
Transmit Code 39 Check Digit	Disable	13-27
Code 39 Full ASCII Conversion	Disable	13-27
Buffer Code 39	Disable	13-28
Code 93		
Code 93	Disable	13-30
Set Lengths for Code 93	4 to 55	13-31
Code 11		
Code 11	Disable	13-32
Set Lengths for Code 11	4 to 55	13-33
Code 11 Check Digit Verification	Disable	13-34
Transmit Code 11 Check Digits	Disable	13-34
Interleaved 2 of 5 (I 2 of 5)		
Interleaved 2 of 5 (I 2 of 5)	Enable	13-35
Set Lengths for Interleaved 2 of 5	14	13-35
I 2 of 5 Check Digit Verification	Disable	13-37
Transmit I 2 of 5 Check Digit	Disable	13-37
Convert I 2 of 5 to EAN-13	Disable	13-38
Discrete 2 of 5 (D 2 of 5)		
Discrete 2 of 5	Disable	13-39
Set Lengths for D 2 of 5	12	13-39
Codabar (NW - 7)		
Codabar	Disable	13-41
Set Lengths for Codabar	5 to 55	13-42
CLSI Editing	Disable	13-43
[1]User selection is required to configure this interface and this is the most common selection.		

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
NOTIS Editing	Disable	13-43
MSI		
MSI	Disable	13-44
Set Lengths for MSI	4 to 55	13-44
MSI Check Digits	One	13-46
Transmit MSI Check Digit(s)	Disable	13-46
MSI Check Digit Algorithm	Mod 10/Mod 10	13-47
Postal Codes		
US Postnet	Enable	13-48
US Planet	Enable	13-48
UK Postal	Enable	13-49
Transmit UK Postal Check Digit	Enable	13-49
Japan Postal	Enable	13-50
Australian Postal	Enable	13-50
Dutch Postal	Enable	13-51
Transmit US Postal Check Digit	Enable	13-51
RSS (Reduced Space Symbology)		
RSS 14	Enable	13-52
RSS Limited	Enable	13-52
RSS Expanded	Enable	13-53
Convert RSS to UPC/EAN	Disable	13-53
Composite		
Composite CC-C	Disable	13-54
Composite CC-A/B	Disable	13-54
Composite TLC-39	Disable	13-55
UPC Composite Mode	Always Linked	13-55
UCC/EAN-128 Emulation Mode for UCC/EAN Composite Codes	Disable	13-56

[1]User selection is required to configure this interface and this is the most common selection.

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
2D Symbologies		
PDF417	Enable	13-57
MicroPDF417	Disable	13-57
Code 128 Emulation	Disable	13-58
Data Matrix	Enable	13-58
Maxicode	Enable	13-59
QR Code	Enable	13-59
Symbology - Specific Security Levels		
Redundancy Level	1	13-60
Security Levels	0	13-62
Intercharacter Gap Size	Normal	13-64
Macro PDF		
Flush Macro PDF Buffer		13-65
Abort Macro PDF Entry		13-65
Miscellaneous Scanner Options		
Transmit Code ID Character	None	14-4
Prefix Value	7013 <CR><LF>	14-5
Suffix 1 Value Suffix 2 Value	7013 <CR><LF>	14-5
Scan Data Transmission Format	Data As Is	14-6
FN1 Substitution Values	Set FN1 Substitution Value	14-7
Transmit “No Read” Message	Disable No Read	14-8
Report Version		14-8
[1]User selection is required to configure this interface and this is the most common selection.		

B

Programming Reference

Symbol Code Identifiers B-3
AIM Code Identifiers B-4

Symbol Code Identifiers

Table B-1. Symbol Code Characters

Code Character	Code Type
A	UPC-A, UPC-E, UPC-E1, EAN-8, EAN-13
B	Code 39, Code 32
C	Codabar
D	Code 128
E	Code 93
F	Interleaved 2 of 5
G	Discrete 2 of 5, or Discrete 2 of 5 IATA
H	Code 11
J	MSI
K	UCC/EAN-128
L	Bookland EAN
M	Trioptic Code 39
N	Coupon Code
R	RSS Family
T	UCC Composite, TLC 39
X	PDF417, Macro PDF417, Micro PDF417
P00	Data Matrix
P01	QR Code
P02	Maxicode
P03	US Postnet
P04	US Planet
P05	Japan Postal
P06	UK Postal
P08	Dutch Postal
P09	Australian Postal
P09	UK Postal

AIM Code Identifiers

Each AIM Code Identifier contains the three-character string **]cm** where:

] = Flag Character (ASCII 93)
c = Code Character (see Table B-2)
m = Modifier Character (see Table B-3)

Table B-2. Aim Code Characters

Code Character	Code Type
A	Code 39, Code 39 Full ASCII, Code 32
C	Code 128, Coupon (Code 128 portion)
d	Data Matrix
E	UPC/EAN, Coupon (UPC portion)
e	RSS Family
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
L	PDF417, Macro PDF417, Micro PDF417
M	MSI
Q	QR Code
S	Discrete 2 of 5, IATA 2 of 5
U	Maxicode
X	Bookland EAN, Trioptic Code 39, US Postnet, US Planet, UK Postal, Japan Postal, Australian Postal, Dutch Postal

The modifier character is the sum of the applicable option values based on Table B-3.

Table B-3. Modifier Characters

Code Type	Option Value	Option
Code 39	0	No check character or Full ASCII processing.
	1	Reader has checked one check character.
	3	Reader has checked and stripped check character.
	4	Reader has performed Full ASCII character conversion.
	5	Reader has performed Full ASCII character conversion and checked one check character.
	7	Reader has performed Full ASCII character conversion and checked and stripped check character.
	Example: A Full ASCII bar code with check character W, **A+I+MI+DW**, is transmitted as **]A7**AIMID where 7 = (3+4).	
Trioptic Code 39	0	No option specified at this time. Always transmit 0.
	Example: A Trioptic bar code 412356 is transmitted as **]X0**412356	
Code 128	0	Standard data packet, no Function code 1 in first symbol position.
	1	Function code 1 in first symbol character position.
	2	Function code 1 in second symbol character position.
	Example: A Code (EAN) 128 bar code with Function 1 character ^{FNC1} in the first position, AIMID is transmitted as **]C1**AIMID	
I 2 of 5	0	No check digit processing.
	1	Reader has validated check digit.
	3	Reader has validated and stripped check digit.
	Example: An I 2 of 5 bar code without check digit, 4123, is transmitted as **]I0**4123	
Codabar	0	No check digit processing.
	1	Reader has checked check digit.
	3	Reader has stripped check digit before transmission.
	Example: A Codabar bar code without check digit, 4123, is transmitted as **]F0**4123	
Code 93	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as **]G0**012345678905	
MSI	0	Check digits are sent.
	1	No check digit is sent.
	Example: An MSI bar code 4123, with a single check digit checked, is transmitted as **]M1**4123	
D 2 of 5	0	No options specified at this time. Always transmit 0.
	Example: A D 2 of 5 bar code 4123, is transmitted as **]S0**4123	
UPC/EAN	0	Standard packet in full EAN country code format, which is 13 digits for UPC-A and UPC-E (not including supplemental data).
	1	Two-digit supplement data only.
	2	Five-digit supplement data only.
	4	EAN-8 data packet.
	Example: A UPC-A bar code 012345678905 is transmitted as **]E0**0012345678905	

Table B-3. Modifier Characters (Continued)

Code Type	Option Value	Option
Bookland EAN	0	No options specified at this time. Always transmit 0.
	Example: A Bookland EAN bar code 123456789X is transmitted as **]X0**123456789X	
Code 11	0	Single check digit
	1	Two check digits
	3	Check characters validated but not transmitted.
RSS Family		No option specified at this time. Always transmit 0. RSS-14 and RSS-Limited transmit with an Application Identifier "01". Note: In UCC/EAN-128 emulation mode, RSS is transmitted using Code 128 rules (i.e.,]C1).
	Example: An RSS-14 bar code 100123456788902 is transmitted as **]e**0011001234567889O2.	
EAN.UCC Composites (RSS, UCC/EAN-128, 2D portion of UPC composite)		Native mode transmission. Note: UPC portion of composite is transmitted using UPC rules.
	0	Standard data packet.
	1	Data packet containing the data following an encoded symbol separator character.
	2	Data packet containing the data following an escape mechanism character. The data packet does not support the ECI protocol.
	3	Data packet containing the data following an escape mechanism character. The data packet supports the ECI protocol.
		UCC/EAN-128 emulation Note: UPC portion of composite is transmitted using UPC rules.
	1	Data packet is a UCC/EAN-128 symbol (i.e., data is preceded with]JC1).
PDF417, Micro PDF417	0	Reader set to conform to protocol defined in 1994 PDF417 symbology specifications. **Note:** When this option is transmitted, the receiver cannot reliably determine whether ECIs have been invoked or whether data byte 92_{DEC} has been doubled in transmission.
	1	Reader set to follow the ECI protocol (Extended Channel Interpretation). All data characters 92_{DEC} are doubled.
	2	Reader set for Basic Channel operation (no escape character transmission protocol). Data characters 92_{DEC} are not doubled. **Note:** When decoders are set to this mode, unbuffered Macro symbols and symbols requiring the decoder to convey ECI escape sequences cannot be transmitted.
	3	The bar code contains a UCC/EAN-128 symbol, and the first codeword is 903-907, 912, 914, 915.
	4	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 908-909.
	5	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 910-911.
	Example: A PDF417 bar code ABCD, with no transmission protocol enabled, is transmitted as]L2ABCD.	
Data Matrix	0	ECC 000-140, not supported.
	1	ECC 200.
	2	ECC 200, FNC1 in first or fifth position.
	3	ECC 200, FNC1 in second or sixth position.
	4	ECC 200, ECI protocol implemented.
	5	ECC 200, FNC1 in first or fifth position, ECI protocol implemented.
	6	ECC 200, FNC1 in second or sixth position, ECI protocol implemented.

Table B-3. Modifier Characters (Continued)

Code Type	Option Value	Option
MaxiCode	0	Symbol in Mode 4 or 5.
	1	Symbol in Mode 2 or 3.
	2	Symbol in Mode 4 or 5, ECI protocol implemented.
	3	Symbol in Mode 2 or 3, ECI protocol implemented in secondary message.
QR Code	0	Model 1 symbol.
	1	Model 2 symbol, ECI protocol not implemented.
	2	Model 2 symbol, ECI protocol implemented.
	3	Model 2 symbol, ECI protocol not implemented, FNC1 implied in first position.
	4	Model 2 symbol, ECI protocol implemented, FNC1 implied in first position.
	5	Model 2 symbol, ECI protocol not implemented, FNC1 implied in second position.
	6	Model 2 symbol, ECI protocol implemented, FNC1 implied in second position.

C

Sample Bar Codes

UPC-A C-3
UPC-E C-3
UPC-E1 . . . . . C-3
EAN-13 . . . . . C-4
EAN-8 . . . . . C-4
Code 39. . . . . C-4
Trioptic Code 39 . . . . . C-4
Code 93. . . . . C-5
Code 11. . . . . C-5
Codabar C-5
MSI C-5
Interleaved 2 of 5 . . . . . C-6
RSS 14 . . . . . C-6
PDF417 . . . . . C-6
Data Matrix C-6
Maxicode C-7
QR Code C-7
US Postnet C-7
UK Postal C-7

Note

Enable the code type of each sample bar code in order to decode that bar code. See *Chapter 13, Symbologies*.

UPC-A

UPC-E

UPC-E1

EAN-13

EAN-8

Code 39

Trioptic Code 39

Code 93

Code 11

Codabar

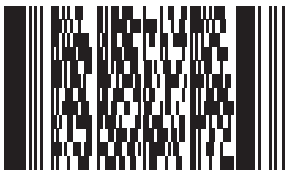
MSI

Interleaved 2 of 5

RSS 14

01761234156234 11

PDF417

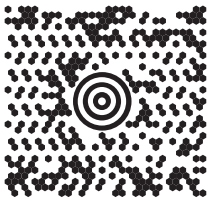


12345678910abcdefghijklmnopqrstuvwxyz

Data Matrix

123456789abcdefghijklmnopqrstuvwxyz

Maxicode



123456000001666Symbol Technologies

QR Code

0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

US Postnet

UK Postal

D

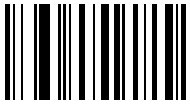
Numeric Bar Codes

0, 1, 2, 3 . . . . . D-3
4, 5, 6, 7 . . . . . D-4
8, 9 . . . . . D-5
Cancel D-5

0, 1, 2, 3

For parameters requiring specific numeric values, scan the numbered bar code(s).

0



1

2

3

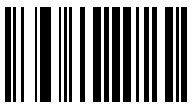
4, 5, 6, 7

For parameters requiring specific numeric values, scan the numbered bar code(s).

4

5

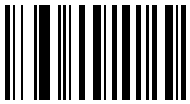
6



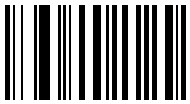
7

8, 9

For parameters requiring specific numeric values, scan the numbered bar code(s).



8



9

Cancel

In case of an error or to change the selection, scan the bar code below.

Cancel

Glossary

AIM	Automatic Identification Manufacturers, Inc. is the trade association for manufacturers of automatic identification systems.
Alphanumeric	A character set that contains letters, numbers and other characters such as special symbols.
Aperture	The opening in an optical system defined by a lens or baffle that establishes the field of view.
ASCII	American Standard Code for Information Interchange. A 7-bit-plus-parity code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.
Aspect Ratio	The ratio of symbol height to symbol length in a 2-dimensional symbol.
Autodiscrimination	The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.

Automatic Identification System	The application of various technologies, such as bar code recognition, image recognition, voice recognition and RF/MW transponders, for the purpose of data entry into a data processing system and bypassing the key-entry component of traditional data entry.
Background	The area surrounding a printed symbol including the spaces and quiet zones.
Bar	The dark element in a printed bar code symbol.
Bar Code	An array of parallel rectangular bars and spaces arranged according to the encodation rules of a particular symbol specification in order to represent data in machine-readable form (i.e., Code 39).
Bar Code Character	A single group of bars and spaces which represent an individual number, letter, punctuation mark or other symbol.
Bar Code Density	The number of characters represented per unit of measurement (e.g., characters per inch).
Bar Code Reader	A device used to read or decode a bar code symbol.
Bar Code Symbol	The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns, that together form a complete scannable entity (see *Symbol*).
Bar Height	The dimension of a bar measured perpendicular to the bar width (see *Y Dimension*).
Bar Width	Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar (see *X Dimension*).
Baud Rate	A measure of the data flow or number of signaling events occurring per second. When one bit is the standard "event," this is a measure of bits per second (bps). For example, a baud rate of 50 means transmission of 50 bits of data per second.
Bi-directional	Denotes that a machine-readable symbol can be read successfully in two directions – either backwards or forwards. Also identifies a scanner that can operate or a bar code that can be read independent of scanning direction.
Binary	Denotes a numbering system to base 2 in which numbers are expressed as combinations of the digits 0 and 1 with positional weighting based on powers of 2. In computing, these can be represented electrically by 'off' and 'on' respectively or in machine-readable symbols by narrow and wide elements or by the absence or presence of a bar module.
Bit	Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.
Class 1 Bluetooth	Standard for Bluetooth radio transmission for a range of up to 100m.

Class 2 Bluetooth — Standard for Bluetooth radio that restricts the transmission range to 10m in order to reduce the effect of the radio on neighboring wireless systems.

Byte — A sequential series of bits comprising one character and handled as one unit. Usually encoded in the ASCII format, a byte usually consists of eight bits and represents one alphabetic or special character, two decimal digits or eight binary bits.

CDRH — Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class 1 — This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2 — No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

Character — A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set — Those characters available for encoding in a particular bar code symbology.

Check Digit — A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar — A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).

Code — A set of unambiguous rules specifying the way in which data may be represented as numbers and letters used to represent information.

Code 11 — A high density numeric symbology requiring a checksum for calculation. The Code 11 character set consists of bar code symbols representing the numbers 0-9, a dash symbol, the start character, and the stop character.

Code 128 — A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39) — A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9, and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Code 49	This symbol is a stack of 2 to 8 rows. Each row encodes row count information plus data characters. For more information, go to the AIM web site or the ANSI web site (see *Stacked Symbol (2D Symbols)*).
Code 93	An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.
Code Length	Number of data characters in a bar code between the start and stop characters, not including those characters.
Codeword	As a symbol character value, this is an intermediate level of coding between source data and the graphical encodation in the symbol.
Concatenation	The construction of a string of data from two or more strings by appending each string in succession. The linking or chaining together of separate items of data in a bar code symbol or of the data contained in two or more separate bar code symbols (also referred to as message append and structured append).
Continuous Code	A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.
Contrast	The difference in reflectance between the black and white (or bar and space) areas of a symbol.
Data Identifier	A specified character or string of characters that defines the intended use of the data element that follows. For the purposes of automatic data capture technologies, data identifier refers to the alphanumeric identifiers as defined in ANSI MH10.8.2, formerly known as ANSI/FACT data identifiers.

Data Matrix

This error correcting, 2-dimensional matrix symbology is capable of encoding various character sets including strictly numeric data, alphanumeric data and all ISO 646 (ASCII) characters, as well as special character sets. The symbology has both error detection and error correction features. Each Data Matrix symbol consists of data regions, which contain nominally square modules set out in a regular array. A dark module is a binary 1 and a light module is a binary 0. There is no specified minimum or maximum for the X or Y dimension. The data region is surrounded by a finder pattern, a perimeter to the data region that is 1 module wide, which is surrounded by a quiet zone on all four sides of the symbol. Two adjacent sides are solid dark lines used primarily to define physical size, orientation and symbol distortion. The two opposite sides consist of alternating dark and light modules. These are used primarily to define the cell structure but also assist in determining physical size and distortion.

There are 2 types of Data Matrix symbologies: ECC 000 - 140 with several available levels of convolutional error correction, and ECC 200, which uses Reed-Solomon error correction. For ISO/IEC JTC 1/SC 31 purposes, only ECC 200 is recommended. The intellectual property rights associated with Data Matrix have been committed to the public domain.

Data Structure

The stipulation of the type of information that is included in a bar code, such as its order and format.

Dead Zone

An area within a scanner's field of view, in which specular reflection may prevent a successful decode.

Decode

To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

Decode Algorithm

A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decoder

An electronic package that receives the signals from the scanning function, performs the algorithm to interpret the signals into meaningful data and provides the interface to other devices.

Density

Describes the relative amount of memory contained in a radio frequency identification tag (see *Bar Code Density*).

Depth of Field

The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Diffuse Reflection

The component of reflected light that emanates in all directions from the reflecting surface.

Discrete 2 of 5

A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

Discrete Code

A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

EAN	European Article Number. This European/international version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.
EAN/U.P.C.	A fixed-length, numeric 13-digit bar code symbol consisting of 30 dark elements and 29 intervening light elements. Each character is represented by 2 bars and 2 spaces over 7 modules. A bar may be comprised of 1, 2, 3 or 4 modules. Each EAN/U.P.C. symbol consists of a leading quiet zone, a start pattern, 7 left-hand data characters, a center bar pattern, 5 right-hand data characters, a Modulo 10 check character, a stop pattern and a trailing quiet zone. U.P.C. is often considered a 12-digit code. The 13th digit of EAN/U.P.C. symbol is a derived character in the left-most position. In the case of U.P.C., this derived left-most character is a 0.
Element	Generic term for a bar or space.
Encoded Area	Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.
Error Correction	A reader or decoder's use of mathematical schemes to reconstruct or replace damaged or missing symbol characters to enable the reading of the symbol data.
Error Detection	This occurs when error-correction characters detect that the presence of errors in the symbol exceeds the error correction capacity, and keeps the symbol from being decoded as erroneous data.
Error-Correction Characters	Symbol characters used for error correction and detection, calculated automatically from the other symbol characters.
Error-Correction Level	An indicator of the number of characters used in a symbology for error correction. A higher level of error correction allows for correcting greater potential symbol damage.
Error-Detection Characters	Symbol characters reserved for error detection that are calculated automatically from the other symbol characters.
Fixed Beam Bar Code Reader	A scanning device where scanning motion is achieved by moving the object relative to the reader; as opposed to a moving beam reader.
Guard Bars	Bars located at both ends and the center of a UPC and EAN symbol to provide reference points for scanning.
Horizontal Bar Code	A bar code or symbol with an overall length dimension that is parallel to the horizon, which resembles a picket fence.
Host Computer	A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs, and network control.
IEC	International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class 1

This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

Intercharacter Gap

The space between two adjacent bar code characters in a discrete code.

Interleaved 2 of 5

A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Interleaved Bar Code

A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

LASER - Light Amplification by Stimulated Emission of Radiation

The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode

A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

Laser Scanner

An optical bar code reading device using a coherent laser light beam as its source of illumination.

LED Indicator

A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.

Matrix Symbols

A 2-dimensional array of regular polygon shaped cells where the center-to-center distance of adjacent elements is uniform. The arrangement of the cells represents data and/or symbology functions. Matrix symbols may include recognition patterns that do not follow the same rule as the other elements within the symbol (i.e., Data Matrix and MaxiCode).

MIL

1 mil = 1 thousandth of an inch; a unit of measure often used to quantify bar code printing and scanning dimensions.

Misread (Misdecode)

A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

Module (1) The narrowest nominal width unit of measure in a symbol. In certain symbologies, element widths are specified as multiples of 1 module. Equivalent to X dimension; or (2) a single cell in a matrix symbology used to encode 1 bit of data. In MaxiCode, the module shape is a regular hexagon. In Data Matrix, the module shape is nominally square. In PDF417, the module shape is a regular rectangle. In bar code symbologies, the module shape is a regular rectangle.

Module Check Digit or Character A character within the symbol data field calculated using modular arithmetic that is used for error detection. The calculated character is determined by applying a code algorithm to the data field contents (see *Check Digit*).

Moving Beam Bar Code Reader A device where scanning motion is achieved by mechanically moving the optical geometry.

MRD Minimum reflectance difference: a formula that is used to determine if there is an adequate difference between absorbed and reflected light.

MSI Based on the original Plessey Code, MSI, also known as Modified Plessey, is a continuous, non-self-checking symbology used to mark retail shelves for inventory control.

Nanometer Unit of measure used to define the wavelength of light that is equal to 10-9 meter.

Nominal The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

Nominal Size Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

Non-Contact Reader/Scanner Bar code readers requiring no physical contact with the printed symbol.

Non-read The absence of data at the scanner output after an attempted scan, which is due to no code, defective code, scanner failure or operator error.

Omnidirectional Bar codes read in any orientation relative to the scanner.

Optical Throw The distance from the scanner face to the closest point at which symbol can be read; also, optical throw is the difference between range and depth of field.

Orientation The alignment of the symbol's scan path. Two possible orientations are horizontal with vertical bars and spaces (picket fence) and vertical with horizontal bars and spaces (ladder).

Overhead The fixed number of characters required for start, stop and checking in a given symbol. For example, a symbol requiring a start, stop and 2 check characters contains 4 characters of overhead.

Parameter A variable that can have different values assigned to it.

PDF417	An error correcting 2-dimensional multi-row symbol developed in 1992 by Symbol Technologies, PDF417 symbols are constructed from 4 bars and 4 spaces over 17 modules. The symbol size is from 3 to 90 rows. There is no specified minimum or maximum for X or Y dimension. With at least the recommended minimum level of error correction, the recommended Y dimension is 3X. With less than the minimum recommended level of error correction, the recommended Y dimension is 4X. A quiet zone of 2X is specified on each side of a symbol. Because of delta decode techniques, the symbology is immune from uniform bar width growth. PDF417 supports cross-row scanning. The intellectual property rights associated with PDF417 have been committed to the public domain.
Percent Decode	The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.
Pitch	Rotation of a bar code symbol in an axis parallel to the direction of the bars.
Plessey Code	A pulse-width, modulated bar code commonly used for shelf marking in grocery stores.
Postnet Code	Code developed by the U.S. Postal Service to assist in the automatic sorting of mail.
Print Contrast Signal (PCS)	Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.
Programming Mode	The state in which a scanner is configured for parameter values (see *Scanning Mode*).
Quiet Zone	A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.
Radio Frequency	Non-optical automatic identification devices that use radio waves to transmit data.
Radio Frequency Data Communication (RFDC)	Handheld or vehicle mounted units that send and receive messages by radio frequency. Information from the units is displayed on a screen for workers and allows real-time, two-way exchange of data between terminals when one terminal is mobile and the other is a host computer at a remote location.
Radio Frequency Identification (RFID)	The use of small radio transponders that are activated by a reading transmitter. The transponder carries a unique ID code or other information in its memory and can be read at a distance without line of sight.
Radio Frequency Tag	An electronic tag capable of receiving, storing and/or transmitting digital information.
Reflectance	Amount of light returned from an illuminated surface.

Resolution	The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.
RSS	Reduced Space Symbology: A family of space efficient symbologies developed by UCC.EAN.
Scan Area	Area intended to contain a symbol.
Scanner	An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1. Light source (laser or photoelectric cell) - illuminates a bar code. 2. Photodetector - registers the difference in reflected light (more light reflected from spaces). 3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.
Scanning Mode	The scanner is energized, programmed, and ready to read a bar code.
Scanning Sequence	A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.
Self-Checking Code	A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.
Skew	Rotation of a bar code symbol on an axis parallel to the symbol's length.
Space	The lighter element of a bar code formed by the background between bars.
Space Width	The thickness of a space measured from the edge closest to the symbol start character to the trailing edge of the same space.
Specular Reflection	The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.
Stacked Symbol (2D Symbols)	A 2-dimensional (2D) symbol with sequences of linear (width-coded) data that are stacked one upon another (i.e., PDF417).
Start/Stop Character	A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.
Substrate	A foundation material on which a substance or image is placed.
Symbol	A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters, and check characters.
Symbol Aspect Ratio	The ratio of symbol height to symbol width.
Symbol Density	The number of data characters per unit length; usually expressed as characters per inch (CPI).
Symbol Height	The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length	Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.
Symbology	The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39).
Tilt	Rotation of a bar code symbol on an axis perpendicular to the substrate.
Tolerance	Allowable deviation from the nominal bar or space width.
2-dimensional (2D) symbology	A machine-readable symbol which must be examined both vertically and horizontally to read the entire message. A 2D symbol may be one of two types of machine-readable symbols: a Matrix Symbol or a stacked symbol. 2D symbols differ from linear bar codes with the ability for high data content, small size, data efficiency and error correction capability.
UCC	Uniform Code Council: the organization that administers the U.P.C and other retail standards.
UCC.EAN-128	Code 128 with a Function 1 character in the first position that is the symbology used with the UCC.EAN format for a universal product number (UPN).
UPC	Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.
Variable Length Code	A code with a number of encoded characters within a range, as opposed to a code with a fixed number of encoded characters.
Vertical Bar Code	A bar code pattern presented in such orientation that the symbol from start to stop is perpendicular to the horizon. The individual bars are in an array appearing as rungs of a ladder.
Visible Laser Diode (VLD)	A solid state device which produces visible laser light.
Wand Scanner	A handheld scanning device used as a contact bar code or OCR reader.
Wedge	A device that plugs in between a keyboard and a terminal and allows data to be entered by a keyboard or by various types of scanners.
X Dimension	The dimension of the narrowest bar and narrowest space in a bar code.
Y Dimension	The height of the modules in a row of a 2-dimensional symbols.

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